VIGNAN'S

FOUNDATION FOR SCIENCE, TECHNOLOGY & RESEARCH

(Deemed to be University) - Estd. u/s 3 of UGC Act 1956

C22 Curriculum & Course Contents

B.Tech. (MPC Stream)

w.e.f. batch 2022-29

ORIENTATION PROGRAM & PRE SEMESTER

B.Tech.

ORIENTATION PROGRAM

21SA101	-	Orientation Program (Induction)

PRE SEMESTER

22MT101	-	Foundations of Engineering Mathematics (MPC Streams)
22EN101	-	English Language and Communication
22TP101	-	Foundations of Quantitative Aptitude and Logical Reasoning
22AM101	-	IT Tools
22SS104	-	Stories of Indian Independence
22EN102	-	Universal Human Values

COURSE CONTENTS

ORIENTATION & PRE-SEMESTER

22SA101 ORIENTATION PROGRAM

Hours Per Semester :

L	T	P	SL	C
0	30	0	0	1

Hours Per Week :

L	T	P	SL	C
0	2	0	0	1

PREREQUISITE KNOWLEDGE: Nil

COURSE DESCRIPTION AND OBJECTIVES:

This course is intended to help the students in getting adjusted with the new environment, to develop bondage with other students and faculty along with learning the institutional policies. The purpose of the orientation course is to create awareness on various issues that are essential for any individual. To familiarize the fresh entrants with the new environment and system in engineering education.To make the students a responsible citizens.To promote smooth transition from +2 level education to graduate program among students.

MODULE-1

0L+12T+0P+0SL = 12 Hours

UNIT-1

SOCIALIZING:

Interaction with faculty members, Deans, peers, student bodies and alumni.

UNIT-2

ASSOCIATING:

Eco-friendly practice and sustainable living, teaching sessions to school children of adopted villages, Interaction with farmers and identifying the problems, Field Visits.

PRACTICES:

- Stress assessment and management.
- Sustainable living.
- Iconic visit.

MODULE-2

0L+18T+0P+0SL = 18 Hours

UNIT-1

GOVERNING:

Brief about regulations and assessment pattern, Interaction with the functionaries i.e. Chancellor, Vice Chancellor and Registrar.

UNIT-2

EXPERIENCING:

Physical activity, Creative arts, Literary activities.

UNIT-3

MEDITATION:

Customizing Daily routines and Habits, Practicing Meditation.

SKILLS:

- ✓ *Understanding of organizational knowledge.*
- ✓ *Compliance Awareness.*
- ✓ *Team Integration.*
- ✓ *Adaptability and Confidence.*

PRACTICES:

- Yoga and meditation.
- Sports and Games.
- Any of the one creative art.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Mapping with POs
1	Become familiar with the institute ethics and culture.	Apply	7,8,9,10,11
2	Cope up with stress management through meditation.	Analyze	7,8,9,10,11
3	Socially conscious towards the society and environment.	Apply	7,8,9,10,11
4	Build bonds with peers and faculty members.	Apply	7,8,9,10,11

MAPPING OF SUSTAINABLE DEVELOPMENT GOALS (SDGs) :

22MT101 FOUNDATIONS OF ENGINEERING MATHEMATICS

Hours Per Week :

L	T	P	SL	C
0	3	2	0	1

PREREQUISITE KNOWLEDGE: Basics of set theory, Algebra.

COURSE DESCRIPTION AND OBJECTIVES:

This course aims to provide students with fundamental mathematical concepts essential for engineering applications. It covers topics such as set theory, functions, matrices, determinants, calculus, and vectors. Students will develop problem-solving skills and analytical reasoning to apply mathematical principles effectively in various engineering domains.

MODULE-1

0L+06T+04P+0SL=10 Hours

UNIT-1

SETS AND SET OPERATIONS:

Definition and representations of sets, Cardinality, Operations: union, intersection, complement, symmetric difference, Cartesian product, Venn diagrams (basic) and De Morgan's law.

UNIT-2

FUNCTIONS AND EQUATIONS:

Functions and their properties, Domain, Range, Composition of two functions, Types of functions, Inverse of a function.

Polynomials, Factorization, Quadratic equations, Inequalities (linear).

PRACTICES:

- Solve set operation problems using Venn diagrams.
- Compute the domain and range of given functions.
- Verify De Morgan's law with examples.
- Factorize quadratic equations and determine their roots.
- Identify and classify different types of functions.

MODULE-2

0L+12T+08P+0SL=20 Hours

UNIT-1

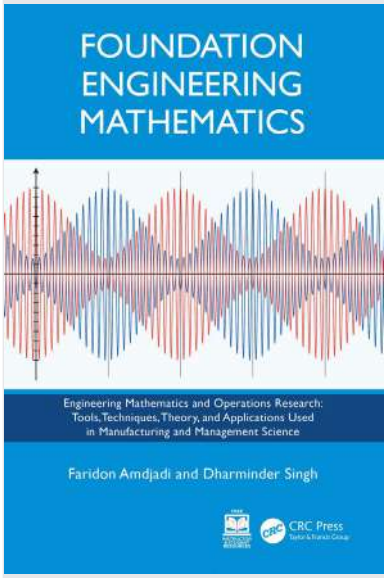
MATRICES AND DETERMINANTS:

Types of matrices, Basic matrix operations: addition, multiplication, transpose (up to 3×3). Determinants and their properties, Inverse of a matrix (if it exists) and its computation (up to 3×3).

UNIT-2

CALCULUS:

Limits and continuity: simple numerical approach, Basic differentiation rules (product, quotient, chain rules), Derivatives of elementary functions (polynomials, exponentials, logarithms, trigonometric functions), Basic integration techniques (substitution, by parts), Definite and indefinite integrals, Geometric interpretation of integrals (area under curves).



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SKILLS:

- ✓ *Mathematical problem-solving.*
- ✓ *Application of algebra, calculus and vectors in engineering.*
- ✓ *Logical reasoning and analytical thinking.*
- ✓ *Graphical and numerical representation of data.*

UNIT-3

VECTORS AND GEOMETRY:

Basic vector operations (addition, scalar multiplication, dot product, cross product, triple product), Geometric interpretation of vectors in 2D and 3D.

PRACTICES:

- Compute determinants and inverse of given matrices.
- Compute matrix operations.
- Solve differentiation problems using product and quotient rules.
- Evaluate definite and indefinite integrals using appropriate techniques.
- Perform vector operations and verify their geometric interpretations.
- Apply matrices to solve systems of linear equations.
- Matrix Multiplication Using the ***Urdhva-Tiryagbhyam Vedic Sutra.*** Compare results with standard methods and reflect on computational efficiency.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to

CO No.	Course Outcomes	Blooms Level	Mapping with POs
1	Solve set theory and function-related problems effectively.	Apply	1, 3
2	Utilize matrices and determinants for engineering applications.	Apply	1, 5
3	Analyze and solve differential and integral calculus problems.	Analyze	2, 6
4	Use vector analysis to interpret real-world problems.	Apply	1, 3
5	Implement mathematical problem-solving skills in engineering.	Apply	2, 10

MAPPING OF SUSTAINABLE DEVELOPMENT GOALS (SDGs) AND INDIAN KNOWLEDGE SYSTEM (IKS) :

TEXT BOOKS:

1. B.S. Grewal, “Higher Engineering Mathematics”, Khanna Publishers, 44th Edition, 2017.
2. Erwin Kreyszig, “Advanced Engineering Mathematics”, John Wiley & Sons, 10th Edition, 2011.

REFERENCE BOOKS:

1. R.K. Jain, S.R.K. Iyengar, “Advanced Engineering Mathematics”, Narosa Publishing, 5th Edition, 2016.
2. H.K. Dass, “Advanced Engineering Mathematics”, S. Chand Publishing, 28th Edition, 2018.
3. M.D. Greenberg, “Advanced Engineering Mathematics”, Pearson Education, 2nd Edition, 1998.

22EN101 ENGLISH LANGUAGE AND COMMUNICATION

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Hours Per Week :

L	T	P	SL	C
0	3	2	0	1

PREREQUISITE KNOWLEDGE: Basic proficiency in English (A1-A2 level), with the ability to understand and participate in simple conversations and write short texts.

COURSE DESCRIPTION AND OBJECTIVES:

This course is designed to strengthen intermediate language skills, focusing on improved fluency, vocabulary expansion, grammatical accuracy, and effective communication in academic, social, and professional settings. The course prepares learners for B1 level proficiency, enabling them to handle a wider range of communication tasks.

MODULE-1

0L + 6T + 4P + 0SL = 10 Hours

UNIT-1

ENHANCING EVERYDAY COMMUNICATION:

- **Reading:** Interpreting short articles, messages, and dialogues with implied meanings.
- **Writing:** Completing guided writing tasks such as formal requests and informal responses.
- **Listening:** Understanding longer conversations and identifying tone and purpose.
- **Speaking:** Describing routines, experiences, and making comparisons using various tenses.

UNIT-2

SOCIAL INTERACTIONS AND OPINIONS:

- **Reading:** Understanding text structures and making inferences.
- **Writing:** Correcting and rewriting passages with grammatical errors.
- **Listening:** Extracting specific and general information from monologues.
- **Speaking:** Expressing personal opinions with justifications in short discussions.

PRACTICES MAPPED WITH IKS:

- Reading emails, blogs, and notices with detailed comprehension: ***Script styles from palm leaf manuscripts.***
- Listening to authentic audio clips and identifying perspectives: ***Oral transmission techniques.***
- Engaging in pair and group discussions on daily topics: ***Community storytelling/council culture.***
- Writing short reports and summaries: ***Panchayat records and administrative logs.***

MODULE-2

0L+12T+08P+0SL=20 Hours

UNIT-1

EXPRESSING THOUGHTS AND OPINIONS:

- **Reading:** Analyzing articles and opinion pieces.
- **Writing:** Writing coherent paragraphs expressing opinions.
- **Listening:** Listening to debates and identifying arguments.
- Speaking: Participating in structured group discussions on likes/dislikes and choices.

SKILLS:

- ✓ *Receptive Skills – Reading and Listening.*
- ✓ *Productive Skills – Writing and Speaking.*
- ✓ *Public Speaking –Presentation.*

UNIT-2

GOALS, ASPIRATIONS, AND PERSONAL DEVELOPMENT:

- **Reading:** Understanding and summarizing goal-setting articles.
- **Writing:** Writing short essays on career plans.
- **Listening:** Comprehending longer audio clips related to personal stories and achievements.
- **Speaking:** Delivering short talks on aspirations and future plans.

UNIT-3

RELATIONSHIPS AND IDENTITY:

- **Reading:** Understanding and analyzing email correspondence.
- **Writing:** Writing formal and informal emails and messages.
- **Listening:** Listening for relationship dynamics and speaker attitude.
- **Speaking:** Giving presentations on personal relationships and milestones.

PRACTICES MAPPED WITH IKS:

- Reading narratives and informative texts: ***Panchatantra, Jataka tales.***
- Listening to podcasts and interviews: ***Oral tradition in storytelling, folk wisdom.***
- Writing structured essays and reflections: ***Spiritual reflection in Indian philosophy.***
- Role-playing interviews and discussions: ***Courtroom and sabha simulations.***

COURSE OUTCOMES:

Upon successful completion of this course, students will be able to:

CO No.	Course Outcomes	Blooms Level	Mapping with POs
1	Interpret intermediate-level texts, including articles, blogs, and personal communications.	Apply	6,7,8,9,11
2	Write structured content such as essays, formal emails, and descriptive paragraphs.	Apply	6,7,8,9,11
3	Analyze speaker's intent, tone, and point of view in spoken texts.	Analyze	6,7,8,9,11
4	Evaluate and present arguments with clarity and coherence.	Evaluate	6,7,8,9,11

MAPPING OF SUSTAINABLE DEVELOPMENT GOALS (SDGs) AND INDIAN KNOWLEDGE SYSTEM (IKS) :

TEXT BOOKS:

1. B1 Preliminary for Schools – Student's Book by Cambridge University Press, 2020.

   Aligned with B1-B2 level learners, this textbook provides comprehensive practice in all four skills using real-world contexts.

REFERENCE BOOKS:

1. B1 Preliminary for Schools Trainer (Six Practice Tests) – Cambridge University Press, 2020.

   Includes exam-style tasks, strategies, and explanations to build confidence and fluency.

2. English Grammar in Use (Intermediate) by Raymond Murphy – Cambridge University Press.

   Self-study grammar book with clear explanations and practice exercises, suitable for B1–B2 learners.

3. Write & Improve – Cambridge Write & Improve online tool.

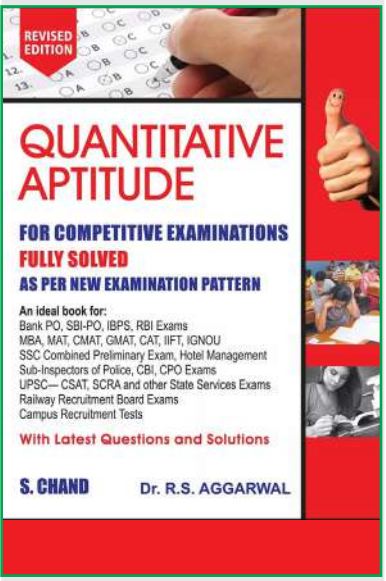
   An interactive writing platform providing real-time feedback to enhance writing skills.

4. BBC Learning English – Intermediate Section – BBC Learning English.

   Free listening, vocabulary, and grammar materials tailored for intermediate learners.

5. Cambridge English Online Dictionary and Thesaurus – https://dictionary.cambridge.org

   Useful for building vocabulary and understanding word usage with examples.



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22TP101 FOUNDATIONS OF QUANTITATIVE APTITUDE AND LOGICAL REASONING

Hours Per Week :

L	T	P	SL	C
0	5	0	0	1

PREREQUISITE KNOWLEDGE: Basic Mathematics Proficiency.

COURSE DESCRIPTION AND OBJECTIVES:

The "Foundation to Intermediate Quantitative Aptitude & Logical Reasoning" course is designed to develop both foundational and advanced skills in arithmetic, data interpretation, puzzles, and logical reasoning. By incorporating hands-on problem-solving exercises, strategic thinking, and time management techniques, the course enhances critical thinking and systematic problem-solving abilities. It equips students with the tools to tackle complex challenges efficiently, improve speed and accuracy, and prepare effectively for competitive exams, placements, and professional tasks.

MODULE-1

0L+10T+0P+0SL=10 Hours

UNIT-1

QUANTITATIVE APTITUDE 1:

Understanding Numbers and Their Types, Finding Common Multiples and Divisors, Percentages and Their Applications of Ratios and Proportions.

UNIT-2

QUANTITATIVE APTITUDE 2:

Calculating Profit, Loss, and Discount, Finding Averages and Solving Mixture Problems, Calculating Simple and Compound Interest, Time and Work Problems.

PRACTICES:

- Each concept would be taught in detail in the class.
- Followed by 10 problems solved in the class.
- Timer based questions solving during class room practice.
- Students would have to solve 10 additional problems as homework assignment in each concept.

MODULE-2

0L+20T+0P+0SL=20 Hours

UNIT-1

QUANTITATIVE APTITUDE 3:

Problems on Time and Distance, Average Speed, Relative Speed and its application on Trains Ages related with Ratios, Introduction to Permutations and Combinations, Probability Problems.

UNIT-2

LOGICAL REASONING 1:

Finding Patterns in Number Series, Identifying Patterns in Letter Sequences, Letter and Number Analogies, Identifying the Odd One Out with multiple categories, Decoding different coded patterns, Syllogism Problems with Venn diagrams.

UNIT-3

LOGICAL REASONING 2:

Puzzles involving Seating related problems, Blood Relations with Family Trees, Solving Problems on Directions, Order and Ranking Problems with multiple criteria, Solving Seating Arrangement Problems, Problems involving Days, Dates in Calendars and Finding different angles in Clocks.

PRACTICES:

- Each concept would be taught in detail in the class.
- Followed by 10 problems solved in the class.
- Timer based questions solving during class room practice.
- Students would have to solve 10 additional problems as homework assignment in each concept.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Mapping with POs
1	Develop foundational skills in arithmetic, algebra, and equations for effective problem-solving.	Apply	1, 5
2	Enhance data interpretation accuracy for graphs and charts.	Analyze	1, 4, 5
3	Build confidence and expertise for aptitude tests and professional exams.	Evaluate	2, 5
4	Master time-efficient problem-solving techniques and systematic approaches to tackle complex challenges.	Create	1, 3, 5
5	Strengthen logical reasoning to solve puzzles, sequences, and arrangements efficiently.	Analyze	2, 6, 11

MAPPING OF SUSTAINABLE DEVELOPMENT GOALS (SDGs):

TEXT BOOKS:

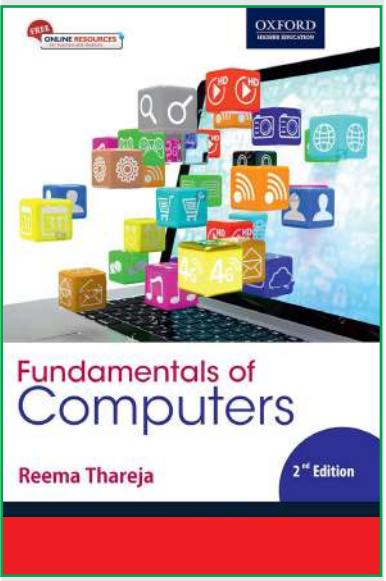
1. 1. R. S. Aggarwal - Quantitative Aptitude for Competitive Examinations - S.Chand Publications - Edition-2023.
2. R. S. Aggarwal - A Modern Approach to Logical Reasoning - S.Chand Publications - Edition-2022.

REFERENCE BOOKS:

1. Trishna Knowledge Systems- Quantitative Aptitude for Competitive Examinations - Pearson Publication - First Edition-2013.
2. R. S. Aggarwal - A Modern Approach to Verbal &Non-Verbal Reasoning - S.Chand Publication - Revised Edition-2018.
3. B.S. Sijwali & S. Sijwali - A New Approach to Reasoning - Arihant Publication - Edition-2018.

SKILLS:

- ✓ *Develop the ability to analyze problems logically and derive effective solutions.*
- ✓ *Master calculations and numerical reasoning for tackling arithmetic and algebraic challenges.*
- ✓ *Gain proficiency in interpreting and analyzing data through charts, graphs, and tables.*
- ✓ *Enhance skills in pattern recognition, critical thinking, and solving puzzles.*
- ✓ *Learn strategies to solve problems quickly and efficiently within time constraints.*



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22AM101 IT TOOLS

Hours Per Week :

L	T	P	SL	C
0	0	5	0	1

PREREQUISITE KNOWLEDGE: Nil

COURSE DESCRIPTION AND OBJECTIVES:

- Equip students with practical knowledge and skills in using essential IT tools such as:
  - Microsoft Word, Excel, and PowerPoint.
  - LaTeX for professional document preparation.
- Enable students to apply these tools in academic, personal, and professional.

MODULE-1

0L+0T+10P+0SL=10 Hours

UNIT-1

WORD:

- Create a table of student marks with subjects, apply shading, change border styles, and align text.
- Create a form letter for a notice and use Mail Merge to send it to a list of student names and roll numbers.
- Design a basic resume with sections for personal info, education, skills, and interests. Use bullet points, alignment, and simple borders.
- Create a 2-column newsletter layout with headers, images, text boxes, and WordArt.
- Create a content index at the top of the page. Add hyperlinks or bookmarks to navigate to each section.
- Create a brochure for a 2-day academic conference with schedule, keynote speakers, and contact info using creative layout and styles.

UNIT-2

EXCEL:

- Format a student mark sheet with at least 5 subjects and calculate total and average.
- Create a payroll system in Excel for 5 employees given Basic salary, 40% for D.A;12% for HRA; 10% for TA; 10% for CCA; 12% for PF; IT 10%. Calculate the gross and net salary.
- Use SUM, AVERAGE, MIN, MAX functions on sales data for five products across 6 months.
- Use an IF function to assign "Pass" or "Fail" based on marks (>35).
- Create a bar chart comparing quarterly sales across different regions.

MODULE-2

0L+0T+18P+0SL=18 Hours

UNIT - 1

ADVANCED EXCEL:

- Highlight all cells in a sales column that are above ₹50,000 using conditional formatting.
- Sort employee records by department and filter to show only those with experience > 5 years.
- Use a Pivot Table to summarize sales by product and region.
- Create an employee lookup sheet where entering an Employee ID returns name, department, and salary.
- Build a monthly attendance sheet for a class, calculate attendance percentage, and highlight students below 75%.
- Develop an EMI calculator that takes principal, interest rate, and tenure to calculate monthly payments.

UNIT-2

POWERPOINT:

- Create a 5-slide presentation introducing yourself—name, interests, hobbies, and goals. Apply different slide layouts and basic transitions.
- Create a 3-slide presentation on your favourite place. Include images, shapes, and text boxes, and use picture styles.
- Create a presentation showing sales data. Insert a table and a chart (bar/pie) to visualize the data.
- Use Slide Master to create a consistent design for all slides (e.g., university (VFSTR) logo in header/footer and common font styling).
- Create a presentation containing an embedded video or audio clip, and set it to play automatically.

UNIT-3

LATEX:

- Create a LaTeX document with a title, author, and date. Include two paragraphs and a section heading.
- Demonstrate text formatting by creating a paragraph using bold, italic, underline, and monospace fonts.
- Create a bulleted list of at least 3 hobbies and a numbered list of your top 3 goals.
- Write the quadratic formula and a few basic math expressions such as fractions, exponents, and square roots.
- Insert an image of your choice (e.g., example-image.jpg) into a document and add a caption below it.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Mapping with POs
1	Create word documents, presentations and spread sheets by applying various tools	Apply	2,5
2	Usage of latex tool for report writing	Apply	5,6

MAPPING OF SUSTAINABLE DEVELOPMENT GOALS (SDGs) :

TEXT BOOKS:

1. Fundamentals of Computers by Reema Thareja, Oxford University Press 2nd edition 2019, India.
2. Lamport, Leslie (1994). LaTeX: A Document Preparation System, User's Guide and Reference Manual (2nd ed.). Pearson Education.
3. LaTeX: A Document Preparation System by Leslie Lamport.

REFERENCE BOOKS:

1. John Walkenbach, Herb Tyson, Michael R.Groh and FaitheWempen, "Microsoft Office 2010 Bible", Wiley.

SKILLS:

- ✓ *Formatting, document design, resume & letter writing, mail merge.*
- ✓ *Data entry, formulas, payroll systems, pivot tables.*
- ✓ *Slide creation, use of multimedia and animations.*
- ✓ *Posters, brochures, magazine cover creation.*
- ✓ *Basic webpage creation using hyperlinks and styles.*
- ✓ *Using Excel for- mulas and data analysis.*
- ✓ *Document design and presentation delivery.*
- ✓ *LaTeX for academic and professional documents.*

22SS104 STORIES OF INDIAN INDEPENDENCE

Hours Per Week :

L	T	P	SL	C
0	2	0	0	1

PREREQUISITE KNOWLEDGE: Basic understanding of Indian history at the high school level.

COURSE DESCRIPTION AND OBJECTIVES:

This course introduces students to the inspiring narratives of India's struggle for independence. It focuses not only on well-known leaders but also on forgotten heroes, movements, and lesser-known revolts that collectively shaped India's freedom story. The course aims to instill national pride, civic consciousness, and leadership qualities in students while strengthening their appreciation for democratic values and social responsibility.

MODULE-1

0L+12T+04P+0SL=12 Hours

UNIT-1

EARLY RESISTANCES AND UNSUNG HEROES:

Revolts Before 1857: Vellore Mutiny, Paika Rebellion, and Sanyasi-Fakir Rebellion; Revolt of 1857: Causes, Course, and Consequences; Tribal and Peasant Uprisings: Santhal Rebellion and Munda Ulgulan; Lesser-Known Freedom Fighters: Rani Gaidinliu; Veerapandiya Kattabomman, and Birsa Munda.

UNIT - 2

PATHBREAKING MOVEMENTS AND LEADERS:

Formation of Indian National Congress and Early Nationalism; Swadeshi and Boycott Movements (1905); Role of Revolutionary Activities: Anushilan Samiti and Hindustan Socialist Republican Association; Transnational and Pan-Indian Movements: Ghadar Movement and Khilafat Movement (Ali Brothers).

PRACTICES:

- Research and present a profile of a lesser-known freedom fighter featured in the unit.
- Prepare a comparative chart on the Revolt of 1857 and the Ghadar Movement.
- Participate in a debate or panel discussion on the role of religion and revolution in India's freedom struggle.
- Create a digital timeline covering key events from early revolts to transnational movements (1800–1920).

MODULE-2

0L+18T+0P+0SL=18 Hours

UNIT-1

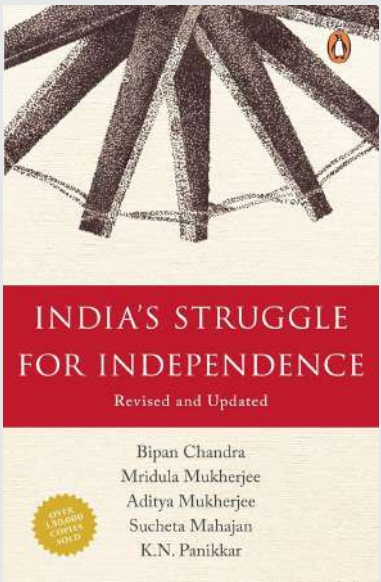
MASS MOVEMENTS AND PEOPLE'S PARTICIPATION:

Non-Cooperation Movement (1920–22); Civil Disobedience Movement and Salt Satyagraha; Quit India Movement (1942): "Do or Die" Spirit; Role of Women and Students in the Freedom Struggle.

UNIT - 2

VISIONARIES AND THEIR LEGACIES:

Mahatma Gandhi: Philosophy of Satyagraha and Ahimsa; Subhas Chandra Bose and INA; Bhagat Singh and Revolutionary Nationalism; Dr. B.R. Ambedkar and the Struggle for Social Justice.



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SKILLS:

- ✓ *Leadership and teamwork by understanding collective struggles.*
- ✓ *Analytical skills through study of strategies and methods used in the freedom struggle.*
- ✓ *Communication skills via storytelling, debates, and presentations.*
- ✓ *Ethical thinking by appreciating sacrifice, social responsibility, and patriotism.*

UNIT - 3

TRANSITION TO INDEPENDENCE:

The Cabinet Mission Plan and Negotiations; Partition and Independence: Causes and Consequences; Integration of Princely States: Sardar Patel's Role; Building a New Nation: Early Challenges.

PRACTICES:

- Group discussions on major movements.
- Role-play / dramatizations: Dandi March, INA Trials, Quit India Movement.
- Documentary review assignments: Freedom struggle films and documentaries.
- Quiz competitions on key events and leaders.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to

CO No.	Course Outcomes	Blooms Level	Mapping with POs
1	Apply knowledge of early revolts and lesser-known freedom fighters to understand regional contributions to India's independence.	Apply	6, 11
2	Analyze the development of nationalist ideologies and the role of revolutionary, religious, and transnational movements.	Analyze	6, 8, 9
3	Evaluate the contributions of women, students, and marginalized communities in shaping the mass movements of the freedom struggle.	Evaluate	6, 7, 11
4	Apply lessons of patriotism, leadership, and social responsibility to contemporary societal roles and ethical decision-making.	Apply	6, 7, 11

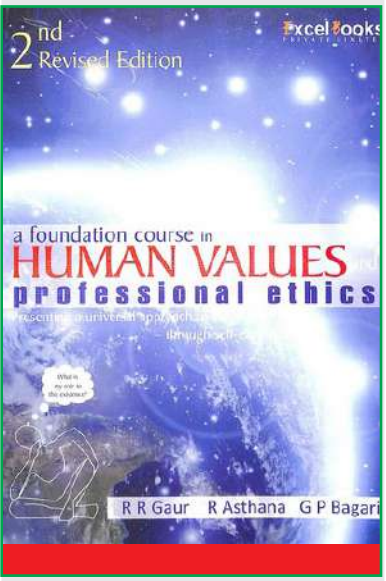
MAPPING OF SUSTAINABLE DEVELOPMENT GOALS (SDGs) AND INDIAN KNOWLEDGE SYSTEM (IKS) :

TEXT BOOKS:

1. Bipin Chandra, India's Struggle for Independence, Penguin, 2016.
2. Sekhar Bandyopadhyay, From Plassey to Partition and After: A History of Modern India, Orient Blackswan, 2014 (Reprint Edition).

REFERENCE BOOKS:

1. Ramachandra Guha, Gandhi: The Years That Changed the World, Penguin, 2018.
2. Sugata Bose, His Majesty's Opponent: Subhas Chandra Bose and India's Struggle against Empire, Harvard University Press, 2011.
3. S. Gopal, Jawaharlal Nehru: A Biography, Harvard University Press.



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22EN102 UNIVERSAL HUMAN VALUES

Hours Per Week :

L	T	P	SL	C
0	2	0	0	1

PREREQUISITE KNOWLEDGE: Nil

PREREQUISITE KNOWLEDGE:

UHV (Universal Human Values) doesn't necessarily require specific prerequisite knowledge. It's designed to be accessible for students with various backgrounds. However, there are some foundational concepts like 'Basic understanding of ethics, Openness to different perspectives, Ability for critical thinking' might be helpful.

COURSE DESCRIPTION AND OBJECTIVE:

This course helps the students to appreciate the essential complementarily between 'Values' and 'Skills' to ensure sustained happiness and prosperity which are the core aspirations of all human beings It also helps to develop students' holistic perspective based on self-exploration about themselves (human being) and their family. It further touches issues very briefly related to their role in the society and the nature.

MODULE-1

0L+16T+0P+2SL=16 Hours

UNIT-1

INTRODUCTION TO VALUE EDUCATION:

Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education) Understanding Value Education, ***(concept of Dharmasastra)*** self-exploration as the Process for Value Education, Continuous Happiness and Prosperity – the Basic Human aspirations. Happiness and Prosperity – Current Scenario.

UNIT-2

HARMONY IN THE HUMAN BEING:

Understanding Human being as the Co-existence of the Self and the Body -Distinguishing between the Needs of the Self and the Body- The Body as an Instrument of the Self- Understanding Harmony in the Self- Harmony of the Self with the Body ***(Concept of Sanyam)*** - Programme to ensure self-regulation and Health.

PRACTICES:

- Sharing about Oneself.
- Talk on Everyday life situation.
- Reflect on what she/he would do in this situation.
- Exploring Natural Acceptance.

MODULE-2

0L+18T+0P+0SL=18 Hours

UNIT-1

HARMONY IN THE FAMILY AND SOCIETY:

Harmony in the Family – the Basic Unit of Human Interaction-'Trust' – the Foundational Value in Relationship, 'Respect and Excellence' – as the Right Evaluation, Other Feelings, Justice in Human-to- Human Relationship, Understanding Harmony in the Society ***(Concept of Nyaya)***.

UNIT-2

HARMONY IN THE NATURE/EXISTENCE:

Harmony in the Nature- Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature- Realizing Existence as Co-existence at All Levels- The Holistic Perception of Harmony in Existence ***(Concept of Pancha Mahabhuta).***

UNIT-3

IMPLICATIONS OF THE HOLISTIC UNDERSTANDING – A LOOK AT PROFESSIONAL ETHICS:

Natural Acceptance of Human Values- Definitiveness of (Ethical) Human Conduct- Competence in Professional Ethics-: Holistic Technologies, Production Systems and Management Models- Typical Case Studies- Strategies for Transition towards Value-based Life and Profession (Concept of Universal Human Values).

PRACTICES:

- Consider the potential consequences of each option (returning vs. keeping).
- Case studies: Analyze real-world examples.
- Group discussions: Sharing perspectives and learn from others' experiences.
- Role-play scenarios to navigate conflict resolution and promote healthy interaction.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Mapping with POs
1	Apply the essentials of human values and skills, self-exploration, happiness and prosperity.	Apply	7,8,9,10
2	Apply to self-regarding the coexistence of the "I" with the body.	Apply	7,8,9,10
3	Identify and evaluate the role of harmony in family, society and universal order.	Evaluate	7,8,9,10
4	Analyze the holistic perception of harmony at all levels of existence.	Analyze	7,8,9,10
5	Develop appropriate technologies and management patterns to create harmony in professional and personal life.	Create	7,8,9,10

MAPPING OF SUSTAINABLE DEVELOPMENT GOALS (SDGs) AND INDIAN KNOWLEDGE SYSTEM (IKS) :

TEXT BOOK:

1. R R Gaur, R Sangal, G P Bagaria, "Human Values and Professional Ethics", Excel Books, New Delhi, 2010.

REFERENCE BOOKS:

1. A.N. Tripathi, "Human Values", New Age Intl. Publishers, New Delhi, 2004.
2. Gergen, K. J. "Relational Being: Beyond Self and Community", United Kingdom: Oxford University, Press, 2009.
3. A Nagraj, "Jeevan Vidya ek Parichay", Divya Path Sansthan, Amarkantak", 1998.
4. E.F. Schumacher, "Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain" 1973.
5. R R Gaur, R Sangal, G P Bagaria, "A Foundation Course in Human Values and Professional Ethics", 2009.

I YEAR

B.Tech.

COURSE CONTENTS
(MPC STREAM)

22MT103	-	Linear Algebra
22MT105	-	Calculus and Ordinary Differential Equations
22PY101	-	Engineering Physics
22CT102	-	Engineering Chemistry
22EE101	-	Basics of Electrical and Electronics Engineering
22ME101	-	Engineering Drawing
22CS101	-	Programming in C
22EN103	-	English Proficiency and Communication Skills
22CT101	-	Environmental Studies
22MS101	-	Management Studies
22CS102	-	Problem Solving through Python
22EN104	-	Technical English Communication
22CY101	-	Cyber Security
22SS101	-	Constitution of India
22SA103	-	Physical fitness
22SA104	-	Life Skills
22SA102	-	Self-understanding and Gender Sensitization
22SS102	-	Indian Knowledge Systems
22SS103	-	Indian Culture and Heritage
22SS105	-	Gerontology
22ME102	-	Do it yourself

22MT103 LINEAR ALGEBRA

Hours Per Week :

L	T	P	SL	C
3	2	0	3	4

PREREQUISITE KNOWLEDGE: Basics of Geometry and Algebra.

COURSE DESCRIPTION AND OBJECTIVES:

This course introduces students to the core concepts of linear algebra, including matrix operations, linear systems, vector spaces and inner product spaces. The objective is to equip students with the necessary mathematical tools to model, analyze and solve real-world problems across various engineering and scientific fields.

MODULE-1

UNIT-1 **18L+12T+0P+18SL= 48 Hours**

MATRICES:

Elementary row and column operations, Elementary matrices, Similar Matrices, Echelon form, Row reduced echelon form, Rank of a matrix, Inverse of a matrix by Gauss-Jordan method, LU decomposition.

UNIT-2

SYSTEMS OF LINEAR EQUATIONS:

Systems of linear equations, Matrix representation, Consistency using rank of the coefficient matrix, Solutions: Gaussian elimination method, Gauss-Jordan method, Do-Little method.

PRACTICES:

- Perform elementary row/column operations and find the rank of a matrix.
- Compute the inverse of a matrix using the Gauss-Jordan method and LU decomposition.
- Check consistency of a system of linear equations.
- Solve homogeneous and non-homogeneous linear systems using Gauss elimination, Gauss-Jordan and Do-Little methods.
- Solve linear systems using the ***Vyaktāvyakta-Nyāya*** (Substitution) and compare with Gaussian elimination. Analyze consistency and computational efficiency.

MODULE-2

UNIT-1 **27L+18T+0P+27SL=72 Hours**

EIGENVALUES, EIGENVECTORS AND DIAGONALIZATION:

Characteristic Equation, Eigenvalues, Eigenvectors and their Properties (without proofs), Cayley-Hamilton Theorem (without proof), Diagonalization of a Matrix (only for diagonalizable matrices).

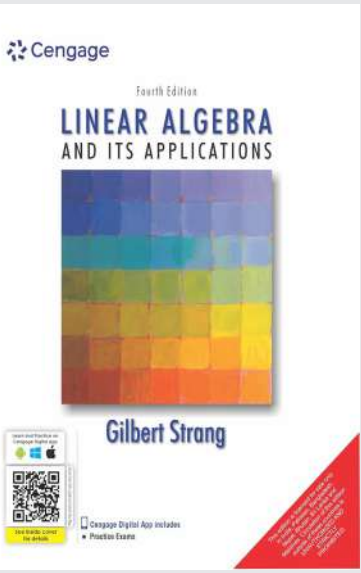
Applications: Inverse of a matrix by Cayley-Hamilton Theorem, Power of a diagonalizable square matrix.

UNIT-2

REAL VECTOR SPACE:

Real vector space, Subspace, Linear dependence and independence, Linear span, Bases and dimension.

Applications: Row space and column space of a matrix, Determining rank of a matrix using row space and column space, Row and column spaces of similar matrices.



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SKILLS:

- ✓ *Understanding abstract algebraic structures.*
- ✓ *Solving linear systems using various numerical techniques.*
- ✓ *Evaluating eigenvalues, eigenvectors and matrix transformations.*
- ✓ *Applying linear algebra in engineering applications.*
- ✓ *Using rthogonalization and decomposition in advanced algorithms*

UNIT-3

REAL INNER PRODUCT SPACE:

Real inner product space, Norm of a vector, Orthogonal set, Orthonormal set, Cauchy-Schwarz inequality, Gram-Schmidt orthogonalization process.

Applications: QR decomposition and singular value decomposition (SVD).

PRACTICES:

- Find eigenvalues and eigenvectors of a given matrix and verify Cayley-Hamilton theorem.
- Determine the diagonalization of a matrix and compute its power using diagonalization.
- Identify vector subspaces, bases and dimensions.
- Determine rank of a matrix using row and column spaces.
- Apply Gram-Schmidt process to find an orthonormal basis of a vector space.
- Perform QR decomposition.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Mapping with POs
1.	Determine the rank of matrices using row operations and solve systems of linear equations to assess their consistency.	Apply	1, 2
2.	Compute eigenvalues, eigenvectors and diagonalization for advanced matrix computations.	Evaluate	1, 2, 5, 9
3.	Analyse and apply inner product space concepts for orthogonalization and decomposition techniques.	Analyze	1, 3, 5
4.	Compare the row and column spaces of similar matrices and evaluate their structural properties for advanced computations.	Apply	1, 2, 9, 10
5.	Utilize linear algebra concepts in real-world applications such as optimization, control systems and artificial intelligence.	Analyze	1, 2, 4, 6, 7, 11

MAPPING OF SUSTAINABLE DEVELOPMENT GOALS (SDGS) AND INDIAN KNOWLEDGE SYSTEM (IKS):

TEXT BOOKS:

1. Gilbert Strang, "Linear Algebra and Its Applications", Cengage Learning, 5th Edition, 2016.
2. Kanti B. Datta, Varma, P. Sekhar, "Calculus, Linear Algebra and Ordinary Differential Equations", Cengage Learning, 1st Edition, 2024.

REFERENCE BOOKS:

1. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley, 10th Edition, 2011.
2. Sheldon Axler, "Linear Algebra Done Right", Springer, 3rd Edition, 2015.
3. George B. Thomas & Ross L. Finney, "Calculus and Analytic Geometry", Addison-Wesley, 9th Edition, 1995.

22MT105 CALCULUS AND ORDINARY DIFFERENTIAL EQUATIONS

Hours Per Week :

L	T	P	SL	C
3	2	0	3	4

PREREQUISITE KNOWLEDGE: Basics of Algebra, Functions, Differentiation and Integration.

COURSE DESCRIPTION AND OBJECTIVES:

This course aims to develop a fundamental understanding of calculus and differential equations, focusing on their applications in engineering and science. Students will explore single-variable and multi-variable calculus, integral calculus and various techniques for solving ordinary differential equations (ODEs). The objective is to equip students with analytical skills and problem-solving techniques that are essential for real-world applications.

MODULE–1

UNIT-1 **18L+12T+0P+18SL=48 Hours**

DIFFERENTIAL CALCULUS (FUNCTIONS OF ONE VARIABLE):

Mean value theorems and applications, Taylor's and Maclaurin's series expansion with remainders, Indeterminate forms, Concavity and convexity of a curve, Points of inflection, Curve sketching.

UNIT-2

INTEGRAL CALCULUS:

Integrations as the limit of a sum, Fundamental theorem of integral calculus, Mean value theorems, Reduction formulae, Rectification, Improper integrals, Tests of convergence (Only statements).

PRACTICES:

- Verify and interpret the Mean Value Theorem.
- Expand functions using Taylor & Maclaurin series and analyse errors.
- Analyse concavity and classify points of inflection.
- Apply the fundamental theorem of calculus to compute definite integrals.

MODULE–2

UNIT-1 **27L+18T+0P+27SL=72 Hours**

MULTIPLE INTEGRALS:

Double and triple integrals, Change of order of integration, Change of variables - Jacobians of Transformations.

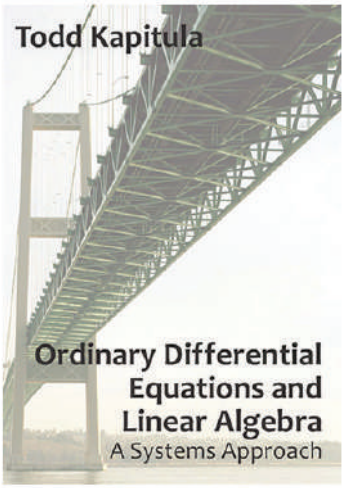
Applications: Computations of areas and volumes, Center of mass and centroid, Moment of inertia.

UNIT-2

FIRST ORDER ORDINARY DIFFERENTIAL EQUATIONS:

Introduction, Order and degree, Formation of ODE from a given one-parameter family of curves, Solutions: Variable separable method, homogeneous, equation reducible to variable separable type, linear and Bernoulli's equations.

Applications: Newton's law of cooling, Natural growth and decay.



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SKILLS:

- ✓ *Understanding function behaviour using calculus principles.*
- ✓ *Evaluating integrals and applying reduction formulas.*
- ✓ *Solving multiple integrals with variable changes and transformations.*
- ✓ *Mastering techniques for solving ODEs and applying them in scientific contexts.*

UNIT-3

SECOND ORDER ORDINARY DIFFERENTIAL EQUATIONS:

Homogeneous and non-homogeneous equations, Complementary functions, Particular integrals, Solution with constant equations: method of undetermined coefficients, variation of parameters.

PRACTICES:

- Solve simple first-order ODEs using separation of variables.
- Evaluate the area under a curve using definite integrals.
- Solve a real-world problem by computing the volume of a solid using triple integrals with appropriate limits.
- Compare and contrast the use of Cartesian vs. polar coordinates in evaluating a given double integral.
- Apply ODEs to Newton's Law of Cooling and natural growth/decay problems.
- Solve circular motion problems using ***Āryabhaṭa's Bhūgola-Nyāya*** (Rotating Earth Principle) and compare with modern calculus. Understand angular speed and how fast things change.

COURSE OUTCOMES:

Upon successful completion of the course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Mapping with POs
1	Apply calculus concepts in problem-solving	Apply	1, 2, 5
2	Analyze the behavior of functions and integrals	Analyze	1, 2, 6
3	Apply multiple integrals and transformations	Apply	1, 4, 5
4	Evaluate solutions of ODEs	Evaluate	1, 4, 10
5	Create solutions for real-world applications	Create	1, 11

MAPPING OF SUSTAINABLE DEVELOPMENT GOALS (SDGS) AND INDIAN KNOWLEDGE SYSTEM (IKS):

TEXT BOOKS:

1. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley, 10th Edition, 2011.
2. Kanti B. Datta, Varma, P. Sekhar, "Calculus, Linear Algebra and Ordinary Differential Equations", Cengage Learning, 1st Edition, 2024.

REFERENCE BOOKS:

1. B.S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, Latest Edition.
2. S.L. Ross, "Differential Equations for Engineers", New Age International Publishers, Latest Edition.
3. James Stewart, "Calculus", Cengage Learning, 8th Edition, 2015.

22PY101 ENGINEERING PHYSICS

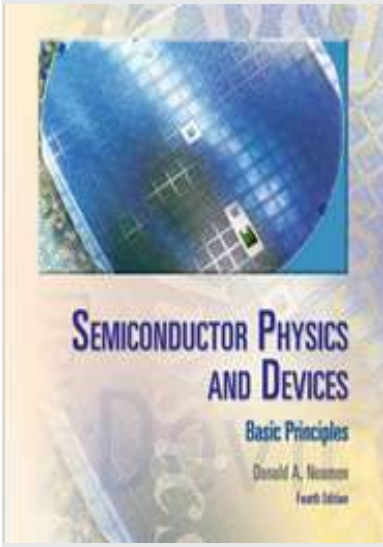
Hours Per Week :

L	T	P	SL	C
3	0	2	3	4

PREREQUISITE KNOWLEDGE: Basics of semiconductors and Quantum mechanics.

COURSE DESCRIPTION AND OBJECTIVES:

This course ensures commensurable understanding of semiconductors and their potential applications. It enunciates the electron dynamics in solids through the conceptual grasp of principles of quantum mechanics. This embarks perspective outlook on optoelectronic devices and optical fibres in the backdrop of semiconductor physics.



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MODULE-1

UNIT-1 **18L+0T+12P+18SL = 48 Hours**

METALS AND SEMICONDUCTORS:

Introduction to metals, expression for electrical conductivity, Introduction to semiconductors-intrinsic, n-type and p-type semiconductors. Electrical conductivity of semiconductors for intrinsic and extrinsic. Hall effect- applications. ***(Concept of Panchabhuta-Five Elements)***

UNIT-2

Introduction to Quantum Mechanics, Dual nature of radiation, de Broglie's concept of matter waves, Uncertainty principle, Schrödinger's time-independent wave equation, Particle confined in a one-dimensional infinite potential well, quantum dots; finite potential well- Quantum Tunnelling: Scanning tunnelling microscope and tunnelling diode (qualitative in view of quantum tunnelling).
Kanada's atomic theory (paramanu)

PRACTICES:

- Determination of Energy Band gap of p-n junction diode.
- Hall Effect - Determination of Hall coefficient.
- Photoelectric Effect-Determination of Planck's constant.
- To study the variations of thermo emf of a copper-constantan thermo-couple with temperature (Seebeck effect).
- Demonstration of tunnelling effect in tunnel diode.

MODULE-2

UNIT-1 **27L+0T+18P+27SL = 72 Hours**

Quantum free electron theory, Fermi-Dirac distribution, electronic specific heat of solids, Density of states (qualitative), success and failures of quantum free electron theory of solids. E-K diagram- classification of materials based on bands in solids, Fermi level in semiconductors- intrinsic and extrinsic.

UNIT-2

p-n junction diode- forward and reverse bias conditions; Solar cell-construction-working-characteristics-applications. Direct and indirect bandgap semiconductors-LED-construction-working-characteristics-applications. Photodiode -construction-working-characteristics- applications. Tunnelling diode.

UNIT-3

Introduction to lasers- difference between normal light and laser light: characteristics of laser light; stimulated absorption, spontaneous and stimulated emission; population inversion, pumping; optical resonator-lasing mechanism; Diode laser- construction-working and applications- Optical fibre communications.

SKILLS:

- ✓ *Apply the quantum laws to understand the electron dynamics of solids.*
- ✓ *Identification of semiconductors for optoelectronic devices.*
- ✓ *Realizing the importance of laser for industrial and commercial applications.*

PRACTICES:

- Study the characteristics of diode.
- Determination of efficiency and Fill factor of a solar cell.
- Determine the efficiency and fill factor of solar cells in Parallel and series combinations.
- Study the V-I characteristics of LED.
- Optical fibre – Determination of Numerical aperture – Acceptance angle.
- Determination of attenuation in Optical fiber.
- Laser - Determination of wavelength.
- Determination of the slit width from Fraunhofer diffraction pattern using LASER beam.
- Demonstration of monochromatic nature of laser light comparing with ordinary light by the principle of dispersion by using Prism.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Mapping with POs
1	Comprehend the nature of metals and semiconductors under different conditions.	Apply	1,2,3,4,9,10,11
2	Apply the principles of quantum mechanics to unravel the latest technical developments.	Apply	1,2,3,4,9,10
3	Categorize the solids based on band theory.	Analyse	1,2,3,4,11
4	Appraise the significance of P-n junction diodes in opto-electronic devices.	Evaluate	1,2,3,4,9,10,11
5	Recognize the versatility of Lasers to realize their applications in latest technical developments.	Apply	1,2,3,4,5,9,10,11

MAPPING OF SUSTAINABLE DEVELOPMENT GOALS (SDGS) AND INDIAN KNOWLEDGE SYSTEM (IKS):

ACTIVITIES:

- P Type and N Type-Hall Effect.
- Study the temperature dependence of resistance for the given material.
- solar Cell-Series and Parallel.

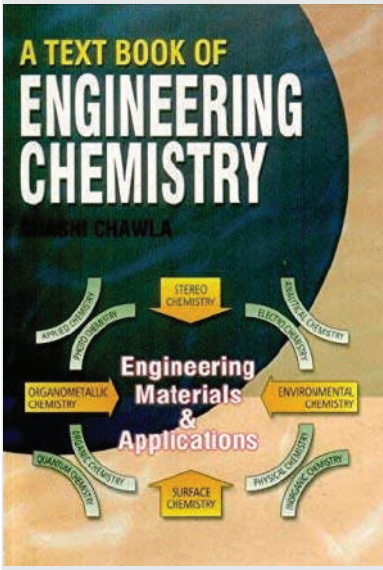
TEXT BOOKS:

1. M. N. Avadhanulu, “Engineering Physics”, S. Chand publications 2010.
2. Donald A. Neamen, “Semiconductor Physics and Devices: Basic principle”, 4th edition, McGraw-Hill, New York, 2012.

REFERENCE BOOKS:

1. D. Halliday, R. Resnick and J. Walker, “Fundamentals of Physics”, 6th edition, John Wiley and Sons, New York, 2001.
2. M. N. Avadhanulu, “Engineering Physics”, S. Chand publications 2010.
3. Charles Kittel, “Introduction to solid state physics”, 7th edition, Wiley, Delhi, 2007.
4. David J. Griffiths, “Introduction to Electrodynamics”, 3rd edition, Prentice Hall of India, New Delhi, 2012.
5. Ashcroft and Mermin, “Solid State Physics”, International student edition, 2008.

22CT102 ENGINEERING CHEMISTRY



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Hours Per Week :

L	T	P	SL	C
3	0	2	3	4

PREREQUISITE KNOWLEDGE: Concept of bonding, chemical reactions and electrochemical cell.

COURSE DESCRIPTION AND OBJECTIVES:

The course aims to cover the importance of chemistry and its applications in engineering disciplines particularly focusing on developing new engineering materials (such as polymers, nanomaterials etc.) and understanding their property for scientific and engineering applications. In addition, the students are also expected to acquire knowledge on electrochemistry and construction of batteries and fuel cells.

MODULE-1

UNIT-1 **18L+0T+12P+18SL = 48 Hours**

CHEMICAL BONDING & STRUCTURE:

Introduction to Chemistry - Chemical bonding, VSEPR and VBT theory; Bond fissions, Introduction to reactive intermediates (carbanion, carbocation and free radical).

UNIT -2

INTRODUCTION TO MATERIALS AND ELECTROCHEMISTRY:

Introduction to materials, Type of materials: Polymers-Introduction and Classification, Nanomaterials-Metal and Carbon nanomaterials, Semiconductors – Introduction. Redox reactions, Electrode potential, EMF of an electrochemical cell.

PRACTICES:

- Determination of Fe (II) by Dichrometry method.
- Determination of strength of Weak acid by pH-method.
- Determination of strength of acid by conductometry.
- Synthesis of Phenol-Formaldehyde resin.
- Synthesis of Urea-Formaldehyde resin.

MODULE-2

UNIT-1 **27L+0T+18P+27SL = 72 Hours**

POLYMERS:

Types of Polymerizations, Preparation, properties, mechanism (free-radical) and applications of PE, Nylon-6,6; Conducting polymers: Introduction, Classification and Mechanism of conduction in Poly-acetylene, Applications. Introduction to Biodegradable polymers.

UNIT-2

ELECTROCHEMICAL ENERGY SYSTEMS:

Introduction - ***Agastya Samhit***ā (Agastya battery), Classification of batteries (primary and secondary). Construction, working and applications of Lead-acid and Li-ion batteries. Fuel Cells-Classification, Construction, working and applications of H_2O_2.

UNIT-3

MATERIALS CHEMISTRY:

Engineering Materials: Refractories - classification, refractoriness RUL, Chemical & Thermal stability; Lubricants – classification, viscosity, viscosity index, flash and fire points, cloud and pour points.

SKILLS:

- ✓ *Synthesize various polymers.*
- ✓ *Synthesize nanomaterials.*
- ✓ *Identify the properties of different industrially relevant engineering materials.*
- ✓ *Understand the different components of an electrochemical cell.*
- ✓ *Design electrochemical cell such as battery.*
- ✓ *Identify the types of energy conversion/storage systems.*

Carbon based Nanomaterials: Carbon nanotubes and graphene's –Synthesis, properties and applications.

Electronic memory devices: Introduction, organic semiconductors for memory devices: p-type semiconductor-pentacene, n-type-semiconductor perfluoropentacene; Introduction to organic memory devices.

PRACTICES:

- Preparation of Nylon-6,6.
- Determination of Strength of an acid in Pb-Acid battery.
- Potentiometer - determination of redox potentials and EMFs.
- Determination of viscosity of oil (Biodiesel, castor oil and coconut oil).
- Purity of lubricant- Saponification and neutralization number.
- Synthesis of magnetic Iron oxide nanoparticles.

COURSEOUTCOMES:

Upon successful completion of this course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Mapping with POs
1	Understand chemical bonding and predicts the molecular geometry and reactivity using bonding VSEPR and VB theories.	Apply	1, 2, 3, 4, 5,8,10,11
2	Apply concepts of materials and electrochemistry to analyse the properties of polymers, nanomaterials, semiconductors, and redox systems.	Apply	1, 2, 3, 4, 5, 8, 9, 10, 11
3	Evaluate polymerization methods and mechanisms to assess the properties and applications of PE, Nylon-6,6, conducting, and biodegradable polymers.	Evaluate	1, 2, 3, 4, 5, 6, 7, 10
4	Analyze the classification, construction, and working principles of electrochemical and fuel cells, and examine their applications in energy storage and conversion.	Analyze	1, 2, 3, 4, 5, 7, 9, 10, 11
5	Apply the concepts of refractories, lubricants, carbon-based nanomaterials, and organic memory devices, and evaluate their properties and applications in engineering.	Apply	1, 2, 3, 4, 5, 6, 7, 9, 10

MAPPING OF SUSTAINABLE DEVELOPMENT GOALS (SDGS) AND INDIAN KNOWLEDGE SYSTEM (IKS):

TEXT BOOKS:

1. S. Chawala, "A Textbook of Engineering Chemistry Engineering Materials and Applications", Dhanpat Rai Publications, 3rd Edition, 2015.
2. K. S. Maheswaramma and M. Chugh, "Engineering Chemistry", Pearson, 1st Edition, 2015.

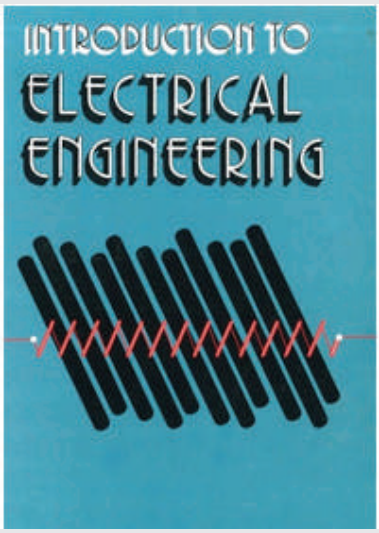
REFERENCE BOOKS:

1. V.R. Gowariker, N. V. Viswanathan, Jayadev, Sreedhar, "Polymer Science", New age Int. Publishers, 4th Edition, 2021
2. Kirby W. Beard, "Linden's Handbook of Batteries", Fifth Edition, McGraw-Hill, 2019.
3. MaliniS, K.S. Anantha Raju, "Chemistry of Engineering materials", CBS publishers Pvt. Ltd., 2022
4. T. Pradeep, "Nano: The Essentials; Understanding of Nano Science and Technology" Tata McGraw-Hill, New Delhi, 2012.
5. Takatoshi Tsujimura, "OLED Display Fundamentals and Applications", Wiley–Blackwell, 2012.

22EE101 BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING

Hours Per Week :

L	T	P	SL	C
2	0	2	2	3



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PREREQUISITE KNOWLEDGE: Basics of Physics.

COURSE DESCRIPTION AND OBJECTIVES:

This course covers fundamental concepts of electrical and electronic circuits, semiconductor devices, and electrical machines. Topics include circuit analysis, AC and DC circuits, magnetic circuits, rectifiers, voltage regulators, and electrical machines like transformers and motors. Hands-on experiments reinforce theoretical concepts for real-world engineering applications.

MODULE-1

UNIT-1 **12L+0T+12P+12SL = 36 Hours**

FUNDAMENTALS OF ELECTRIC AND MAGNETIC CIRCUITS:

Circuit Elements and Laws- Types of circuit components and Sources, ohms law, KVL and KCL, series Parallel circuits, Comparison of DC and AC sources, Characteristics of AC waveform, Response of Resistor, Inductor and Capacitor for AC voltage.

Magnetic circuits- Ohm's law in Magnetic circuit (Magneto motive force, Reluctance and Flux), Analogy of Electrical and Magnetic circuits, Faraday's Law of Electromagnetism, Self and mutual inductances.

UNIT-2

SEMICONDUCTOR DEVICES:

Classification of semiconductors, Formation of PN Junction, Avalanche and Zener breakdown of diode, PN Junction Diode, Zener Diode and BJT-operation and their V-I characteristics, Piecewise linear model of a Diode.

PRACTICES:

- Verification of Ohm's law.
- Verification of Kirchhoff's current law.
- Verification of Kirchhoff's voltage law.
- Determination of R.M.S. Values of sinusoidal waveform.
- Obtain the V-I characteristics of Diode.
- Obtain the V-I characteristics of Zener diode.

MODULE-2

UNIT- 1 **18L+0T+18P+18SL = 54 Hours**

ANALYSIS OF ELECTRICAL CIRCUITS:

Mesh and nodal analysis of resistive circuits with DC source. Response of single- phase ac circuits with RL, RC, RLC loads, Resonant circuits. Introduction to three phase system, Relation between phase and line quantities in star and delta connected systems.

UNIT- 2

ELECTRICAL MACHINES:

SKILLS:

- ✓ *Distinguish between linear and nonlinear elements by looking at VI characteristics.*
- ✓ *Develop a simple loop generator.*
- ✓ *Design a voltage regulator using Zener diode.*
- ✓ *Design a half wave rectifier using PN junction diode.*
- ✓ *Design a full wave rectifier using PN junction diodes.*

DC MACHINES: Construction of DC Machine, DC Generator- working principle, EMF equation, DC Motor-Working principle and Torque equation.

AC MACHINES: Transformer- Construction, Operating Principle, and EMF Equation.

Three Phase Induction motor- Construction, Working Principle, and Torque vs. Slip Characteristic.

UNIT-3

ANALYSIS OF ELECTRONIC CIRCUITS:

Half Wave Rectifier- Operation, Efficiency, Ripple Factor, and Peak Inverse Voltage (PIV); Full Wave Rectifiers- Types, Operation, Efficiency, Ripple Factor, and PIV; Zener Diode as a Voltage Regulator.

PRACTICES:

- Transformation ratio of a single phase transformer at different loads.
- Measurement of Energy in single phase resistive load circuit.
- Measurement of Power in single phase resistive load circuit
- Determination of impedance in complex AC circuits.
- Verification of line and phase quantities in a balanced three phase system

COURSE OUTCOMES:

Upon successful completion of the course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Mapping with POs
1	Analyze the resistive circuits with independent sources and find its solution.	Analyze	1,2,6,9
2	Solve the AC (single and three phase) and DC circuits using different methods.	Apply	1,2,9
3	Apply the concepts of electromagnetism for its applications.	Apply	1,2,3,9
4	Examine the different electrical equipment.	Evaluate	1,2,9
5	Acquire the knowledge of semiconductor devices to create circuits.	Create	1,2,3,9

MAPPING OF SUSTAINABLE DEVELOPMENT GOALS (SDGS):

TEXTBOOK:

1. M Naidu and S. Kamakshiaih, “Introduction to Electrical Engineering”, Tata McGraw-Hill Edition, 2017.

REFERENCE BOOKS:

1. A.K. Thereja and B.L.Thereja, “Electrical Technology”, Vol.–II, S. Chand & Co., Publications, 2020.
2. V. K. Mehta, “Principles of Electrical Engineering and Electronics”, S. Chand & Co., Publications, New Delhi, 2019.
3. D.P. Kothari, “Basic Electrical and Electronics Engineering”, TMH, New Delhi, 2017.

22ME101 ENGINEERING DRAWING

Hours Per Week :

L	T	P	SL	C
2	0	2	2	3

PREREQUISITE KNOWLEDGE: Basics of Geometry.

COURSE DESCRIPTION AND OBJECTIVES:
This course provides a foundational understanding of engineering drawing, focusing on basic projections, dimensioning, and reading technical drawings relevant across various engineering disciplines. The objective is to equip learners with essential skills to visualize, interpret, and communicate design ideas effectively using standard drawing practices.

MODULE-1

UNIT-1 **12L+0T+12P+12SL = 36 Hours**

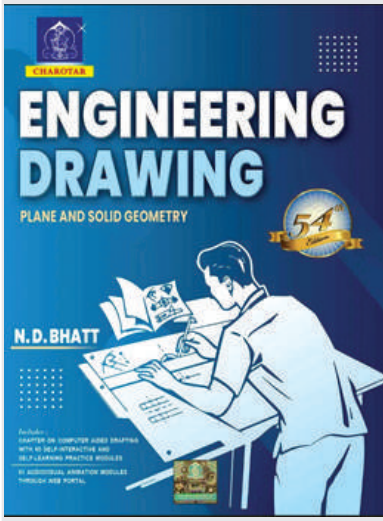
GEOMETRICAL CONSTRUCTIONS AND CONICAL CURVES:
Introduction: Lettering and Dimensioning, Types of Lines.
Geometrical Constructions: Regular polygons using angle, ARC and general methods. Conical Curves: Construction of ellipse, parabola and hyperbola by using eccentricity method.
Śulba Sūtras (Vedic Geometry)

UNIT-2

PROJECTION OF POINTS AND STRAIGHT LINES:
Introduction: Reference planes, importance of reference lines and planes; Principles of projection.
Projection of Points: Projection of points located in any of the four quadrants.
Projection of Straight Lines: Projection of straight lines - parallel to both the reference planes, parallel to the one plane and inclined to other plane, parallel to one plane and perpendicular to other plane.

PRACTICES:

- A road roller covers 'x' kilometres distance in one day & the roller completed 'N' revolutions in a minute. By using the above information, inscribe a regular hexagon and pentagon in a circle of diameter, D. Where 'D' is considered as the diameter of the road roller. Also evaluate the length of each side of the regular hexagon and pentagon.
- A cow is tethered in the middle of a field which is in the form of circular shape and suppose that cow grazes 'x' square meters in a day. By using the above information, inscribe regular hexagon and pentagon in a circle of diameter 'D'.
- Two oranges on a tree are respectively x m and y m above the ground, and p m and q m from a r m thick wall, but on the opposite sides of it. The distance between the oranges, measured along the ground and parallel to the wall is 'L' m. (a) Determine the real distance between the oranges and the angle of inclination of the line joining the oranges with the ground and also with the wall.
- A room measures 'x' m long, 'y' m wide and 'z' m height. Assume (x>y>z). An electric bulb hangs in the centre of the ceiling and 'p' m below it. A thin straight wire connects the bulb to a switch kept in one of the corners of the room and 'r' m above the floor. Draw the projections.
- On lighting a rocket cracker, it gets projected in a parabolic path and reaches a maximum height of 'x' m when it is 'y' m away from the point of projection. Finally, it reaches the ground 'z' m away from the starting point. Find the angle of projection.
- Two pegs fixed on a wall are 'x' meters apart. The distance between the pegs measured parallel to the floor is 'y' meters. If one peg is 'z' meters above the floor. Consider (x>y>z) & assume suitable scales. Design the height of the second peg and the inclination of the line joining the two pegs with the floor. Develop the projections.



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SKILLS:

- ✓ *Convert iso-metric views of objects into orthographic views and vice versa.*
- ✓ *Visualize the shape of the 3D components.*
- ✓ *Create pictorial views by using AutoCAD.*
- ✓ *Understand projections by visualization.*

MODULE-2

UNIT-1 **18L+0T+18P+18SL = 54 hours**

PROJECTIONS OF PLANES:
Regular planes perpendicular to one reference plane and inclined to the other reference plane.

UNIT-2

PROJECTIONS OF SOLIDS:
Axis parallel to one reference plane and inclined to other plane - prisms, pyramids.

UNIT-3

CONVERSION OF ISOMETRIC PROJECTIONS TO ORTHOGRAPHIC PROJECTIONS:
Conversion of isometric views of geometrical shapes, and simple orthographic views.

PRACTICES:

- A plate having shape of an isosceles triangle has base 'x' mm long and altitude 'y' mm. It is so placed that in the front view it is seen as an equilateral triangle of 'x' mm sides and one side inclined at an angle 'θ' degrees to the reference line. Develop its front view and top view.
- Prepare the top-view (plan) of a class-room/lab, home (Drawing Room/Bedroom/ Study Room, Kitchen) along with suitable dimensions.
- A lighting point in a ceiling design is 0 mm above the HP and 50 mm in front of the VP (i.e., lies exactly on HP). Draw views and mark the location. Explain what it means physically.
- A sensor mounted on a panel lies 22 mm below the panel surface (HP) and 60 mm in front of the operator (VP). Draw the reference line and mark views. Justify point placement.
- You are given an isometric view of an L-shaped bracket with holes and steps. Draw the orthographic views (Front, Top, and Right Side views).

ACTIVITIES:

- Developing the following solids with the help of cardboard/ thick paper, cube, cuboid prisms & pyramids (triangular, square, pentagonal, and hexagonal) right circular cylinder and cone.
- Design a Bolt and nut assembly for the given dimensions.
- Design a Connecting rod of IC engine for the given dimensions.
- Design a I.C Engine Piston with piston rings for the given dimensions.

COURSE OUTCOMES:
Upon successful completion of the course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Mapping with POs
1	Creating and interpreting technical drawings.	Apply	1,3,5
2	Apply the drawing skills in representing various geometrical features.	Apply	1,3,5
3	Develop orthographic projections and isometric views of various objects using AutoCAD.	Analyse	1,3,5
4	Sketch simple objects and their pictorial views using Auto-CAD.	Analyse	1,3,5

MAPPING OF SUSTAINABLE DEVELOPMENT GOALS (SDGS) AND INDIAN KNOWLEDGE SYSTEM (IKS):

TEXTBOOK:

1. N D Bhatt, "Engineering Drawing", 54th edition, Charotar Publication, 2023.

REFERENCE BOOKS:

1. S. N. Lal, "Engineering Drawing with an Introduction to Auto CAD", 1st edition, Cengage, 2017.
2. K L Narayana, "Engineering drawing", 2nd edition, SciTech Publications, 2014.

22CS101 PROGRAMMING IN C

Hours Per Week :

L	T	P	SL	C
2	0	4	2	4

PREREQUISITE KNOWLEDGE: Fundamentals of Problem Solving.

COURSE DESCRIPTION AND OBJECTIVES:

This course is aimed to impart knowledge on basic concepts of C programming language and problem solving through programming. It covers basic structure of C program, data types, operators, decision making statements, loops, functions, strings, pointers, structures and unions. At the end of this course, students will be able to design, implement, test and debug complex problems using features of C.

MODULE-1

UNIT-1 **12L+0T+24P +12SL=48 Hours**

INTRODUCTION TO ALGORITHMS AND PROGRAMMING LANGUAGES:

Introduction to Algorithms: Introduction to computational thinking – Problem solving with algorithms and flowcharts - Introduction to C: Structure of a C program - pre-processor statement) inline comments, variable declaration statements, executable statements; C Tokens - C character set, identifiers and keywords, type qualifiers, type modifiers, variables, constants, punctuations and operators.

Data Types and Operators: Basic data types; Formatted I/O; Reading and writing characters; Operators - assignment, arithmetic, relational, logical, bitwise, ternary, address, indirection, sizeof, dot, arrow, parentheses operators; Expressions - operator precedence, associative rules.

Control Statements: Introduction to category of control statements; Conditional branching statements - if, if– else, nested-if, if – else ladder, switch case;

Iterative statements - for, while, do - while, nested loops; Jump statements - break, jump, goto and continue.

Algorithmic logic in Panini's Ashtadhyayi; problem-solving in Indian logic ***(Nyaya Shastra)***, Structured numerical systems – Vedic mathematics and early binary concepts

UNIT-2

FUNCTIONS & POINTERS:

User-defined functions: Function declaration - definition, header of a function, body of a function, function invocation; Call by value, Call by address. Recursion; Library Functions; Storage classes; Scope of a variable.

Pointers: Declaration, Initialization, Multiple indirection, Pointer arithmetic.

Recursive hymns ***(Rigveda),*** modular constructs in Shastra classification, Concepts of abstraction and references in Indian epistemology ***(Pramana).***

MODULE-2

UNIT-1 **18L+0T+36P +18SL=72 Hours**

ARRAYS:

Arrays: Introduction; Types of arrays; Single dimensional array - declaration, initialization, usage, reading, writing, accessing, memory representation, operations; Multidimensional arrays. Passing arrays to functions; Relationship between arrays and pointers, scaling up - array of arrays, array of pointers, pointer to a pointer and pointer to an array; Dynamic memory allocation functions – Creating arrays dynamically and performing operations on them.

Representation of multidimensional data in ancient Indian astronomy and calendar systems Granularity and scalability in system design found in traditional architecture (e.g., ***Vastu***).

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SKILLS:

- ✓ *Analysis of the problem to be solved.*
- ✓ *Select static or dynamic data structures for a given problem and manipulation of data items.*
- ✓ *Develop C programs that are understandable, debuggable, maintainable and more likely to work correctly in the first attempt.*

UNIT-2

STRINGS:

Strings: Character array, reading strings from the standard input device, displaying strings on the standard output device, Importance of terminating a string, Standard string library functions.
Preservation and transmission of Sanskrit and Tamil texts using structured phonetic systems.

UNIT-3

STRUCTURES, UNIONS:

Structures: Defining a structure, declaring structure variable, Operations on structures, Pointers to structure - declaring pointer to a structure, accessing structure members using pointer; Array of structures, Nested structures, passing structures to functions - passing each member of a structure as a separate argument, passing structure variable by value, passing structure variable by reference/ address; Typedef and structures.
Unions: Defining a union - declaring union variable, operations on union.
Classification of knowledge in Indian systems – Charaka Samhita, Manuscripts, Palm-leaf layouts, Group representation in indigenous knowledge frameworks – e.g., Ayurveda Tridosha classification.

COURSE OUTCOMES:

Upon successful completion of the course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Mapping with POs
1	Explain algorithmic problem-solving, flowchart design, and fundamental programming constructs in C.	Apply	1, 2
2	Analyze and implement various control structures (conditional, iterative, and jump statements) for effective decision-making in programs.	Analyze	2, 3, 4
3	Implement modular programming by designing user-defined functions and utilize recursion effectively for problem-solving. Apply array concepts, including single and multi-dimensional arrays, dynamic memory allocation, and pointer-array relationships in programming.	Apply	1, 2, 3, 4, 5
4	Utilize string handling techniques and standard string library functions to solve text-processing problems effectively.	Evaluate	1, 2, 3, 5
5	Design, implement, and analyze structured data types using structures and unions for efficient handling of complex data.	Create	1, 2, 3, 5

MAPPING OF SUSTAINABLE DEVELOPMENT GOALS (SDGS) AND INDIAN KNOWLEDGE SYSTEM (IKS):

TEXTBOOKS:

1. Behrouz A. Forouzan, Richard F.Gilberg, “Programming for Problem Solving”, 1st edition, Cengage publications, 2019.
2. Ajay Mittal, “Programming in C - A Practical Approach”, 1st edition, Pearson Education, India, 2010.

REFERENCE BOOKS:

1. 1. R.G. Dromey, “How to Solve it by Computer”, Prentice-Hall International Series in Computer Science, USA.
2. Reema Thareja, “Computer Fundamentals and Programming in C”, 1st edition, Oxford University Press, India, 2013.
3. Herbert Schildt, “C: The Complete Reference”, 4th edition, Tata McGraw-Hill, 2017.
4. Byron S Gottfried, “Programming with C”, 4th edition, Tata McGraw-Hill, 2018.

22EN103 ENGLISH PROFICIENCY AND COMMUNICATION SKILLS

Hours Per Week :

L	T	P	SL	C
0	0	2	0	1

PREREQUISITE KNOWLEDGE: Basics of grammar, Read and understand for global context, Cultural sensitivity and Basic writing skills.

COURSE DESCRIPTION AND OBJECTIVES:
English Proficiency and Communication Skills seeks to develop the students' abilities in listening, speaking, reading, writing and grammar. The course will provide students an exposure on a wide range of language use in everyday situations. It will make the students to equip with functional English and make them use it confidently in their professional and social contexts. Finally, students will strengthen their listening, speaking, reading, writing skills in English.

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MODULE-1

UNIT-1 **0L+0T+12P +0SL=12 Hours**

MY LIFE AND HOME – MAKING CHOICES – HAVING FUN:

Listening: Understanding short monologues or dialogues and choose the correct visual.

Speaking: Self-introduction, agreeing, disagreeing, making decision, cultural matters in a limited way.

Reading: Understanding main message, factual information global meaning, specific information and paraphrasing.

Writing: Developing hints-based mail, Writing short messages/paragraphs.

Vocabulary: Discerning use of right word suiting the context, B1 Preliminary word list.

Grammar: Frequency Adverbs, State Verbs and Prepositions. In Indian philosophies like ***Vedanta, Sankhya,*** and ***Yoga,*** the concept of cyclical time is fundamental. the ***Atman*** (soul) is eternal and always present. In Indian agriculture, astrology, and spirituality, the regular appearance of seasons or celestial events often translates to frequency. (Life on Earth, governed by cycles of karma and rebirth, reflects actions that happen at varying intervals).

UNIT-2

ON HOLIDAY – DIFFERENT FEELINGS – THAT'S ENTERTAINMENT:

Listening: Understand straightforward instructions or public announcements.

Speaking: Describing people, things and places in a photograph, making suggestions, discussing plans.

Reading: Longer text for detailed comprehension, gist and inference.

Writing: Developing notes and responding to penfriends or 'e-pals'.

Vocabulary/Grammar – Comparatives and Superlatives, Gradable and non-gradable adjectives, Cloze tests.

PRACTICES:

- Developing hints based mail.
- Writing short messages.
- Writing paragraphs.
- Expressing opinions and cultural matters.

SKILLS:

- ✓ *Use of appropriate grammar and vocabulary with syntactic patterns in short texts.*
- ✓ *Read and extract the main message, global meaning, specific information, detailed comprehension, understanding of attitude, opinion and writer purpose and inference.*
- ✓ *Listen to understand key information, specific information, gist and detailed meaning and to interpret meaning.*
- ✓ *Understand questions and make appropriate responses and talk freely on everyday topic.*

- Understanding short monologues.
- Understanding straightforward instructions and public announcements.
- Describing people, things and places in a photograph.

MODULE-2

UNIT-1 **0L+0T+18P +0SL=18 Hours**

GETTING AROUND – INFLUENCES:

Listening: Discussion activities and listening to understand the gist of each short dialogue.

Speaking: Snap Talks, Make and respond to suggestions, discuss alternatives and negotiate agreement.

Reading: Reading for understanding coherence of the text and drawing inferences.

Writing: Reading an announcement from a magazine or website for preparing an article.

Vocabulary / Grammar: Punctuation, Prepositions, (Mount Meru, in Hindu, Buddhist, and Jain cosmology, is considered the center of the universe, and many deities are believed to reside on its peaks). Phrasal Verbs, B1 Preliminary word list.

UNIT-2

STAY FIT AND HEALTHY – LOOKS AMAZING!

Listening: An interview for a detailed understanding of meaning and to identify attitudes and opinions.

Speaking: Discuss likes, dislikes, experiences, opinions, habits, etc.

Reading: Content, Communicative Achievement, Organisation and Language.

Writing: Developing a story with clear links to the given opening sentence.

Vocabulary / Grammar: Modals, Conditionals, Indian philosophy, particularly in Hinduism, Buddhism, and Jainism, the law of karma is central to understanding the relationship between actions and their consequences. Verb forms (Time and Tense).

UNIT-3

THE NATURAL WORLD – EXPRESS YOURSELF!

Listening: Listening for specific purpose, listening for identifying the situation.

Speaking: Discussing sports, discussing everyday objects in photos, talking about habits and routines.

Reading: Reading to identifying text purpose, Identifying opinion and attitude.

Writing: Reported speech, using range of tenses.

Vocabulary / Grammar: Collocations, Adjective Prefixes and Suffixes.

PRACTICES:

- Listening to understand the gist of each short dialogue.
- Listening to an interview for a detailed understanding of meaning and to identify attitudes and opinions.
- Preparing an article.
- Discuss for alternatives and negotiate agreement.
- Discussion on likes, dislikes, experiences, opinions, habits, etc.

ACTIVITIES:

- Snap talks.
- Making and responding suggestions.
- Discussion on likes, dislikes, experiences, opinions, habits, etc.
- Description of people, things and places in a photograph.

COURSE OUTCOMES:

Upon successful completion of the course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Mapping with POs
1	apply to read and grasp content on a range of topics/texts related to their everyday life like notifications, advertisements, travel brochures, news reports, articles.	Apply	7, 8, 9, 10, 11
2	apply suitable strategies to achieve comprehension, like listening for main points and checking comprehension using contextual clues etc.	Apply	7, 8, 9, 10, 11
3	demonstrate vocabulary beyond that of the familiar subjects.	Analyze	7, 8, 9, 10, 11
4	show sufficient control of English grammar and sentence variety to coherently organize information at sentence and discourse levels.	Evaluate	7, 8, 9, 10, 11
5	use functional English to communicate and interact effectively in everyday situations.	Create	7, 8, 9, 10, 11

MAPPING OF SUSTAINABLE DEVELOPMENT GOALS (SDGS) AND INDIAN KNOWLEDGE SYSTEM (IKS):

TEXTBOOK:

1. Emma Heyderman and Peter May, “Complete Preliminary”, Student’s Book with Answers, 2nd edition, Cambridge University Press, 2019.

REFERENCE BOOKS:

1. Annette Capel and Rosemary Nixon, “Introduction to PET”, Oxford University Press, 2009.
2. Adrian Doff and Craig Thaine, “Empower Pre intermediate”, Cambridge University Press, 2015.
3. Louise Hashemi and Barbara Thomas, “Objective PET”, Cambridge University Press, 2010.

22CT101 ENVIRONMENTAL STUDIES

Hours Per Week :

L	T	P	SL	C
2	2	0	2	3

PREREQUISITE KNOWLEDGE: General awareness regarding environmental problems and importance of environmental protection.

COURSE DESCRIPTION AND OBJECTIVES:

It is a multidisciplinary subject where we deal with different aspects using a holistic approach. It is evolving to be the education for sustainable and ethical development both at a local and global level. It helps to prepare the next generation and to plan appropriate strategies for addressing environmental issues. It identifies and create solutions that conserve to manage ecosystem and biodiversity and also helps to eliminate pollutants, toxicants to preserve air, water and soil quality. Environmental education recognize impacts of global issues, enhances the public awareness and helps to take decisions towards environmentally responsible actions.

MODULE-1

UNIT-1 **12L+12T+0P+12SL=36 Hours**

SUSTAINABLE DEVELOPMENT, NATURAL RESOURCES AND ECOSYSTEMS:

Sustainable Development - Concept and Sustainable Development Goals. Natural Resources- Forest, water, energy, mineral and land resources. Concept of Ecology and Ecosystems, Ecological succession, Population Ecology.

UNIT-2

BIODIVERSITY AND ECOSYSTEM CONSERVATION:

Biodiversity concept, Biodiversity hot spots, Biodiversity indices (Simpson index and Shannon index) Threats to biodiversity, Biodiversity conservation (in-situ and ex-situ). ***Traditional Knowledge*** in biodiversity conservation, Ecosystem protection and its maintenance.

PRACTICES:

- Wealth from waste, (development of value-added products from waste materials).
- Biogas production.
- Herbarium sheet preparation.
- Models: wind mills, solar cell, bioenergy, Vertical garden, green building models.
- Preparation of Compost.
- Installation of artificial nests for local bird population.
- On campus plantation programme.
- Disposal of laboratory waste- Individual practice and report writing, lab safety awareness

MODULE-2

UNIT-1 **18L+18T+0P+18SL =54 Hours**

ENVIRONMENTAL ISSUES AND WASTE MANAGEMENT:

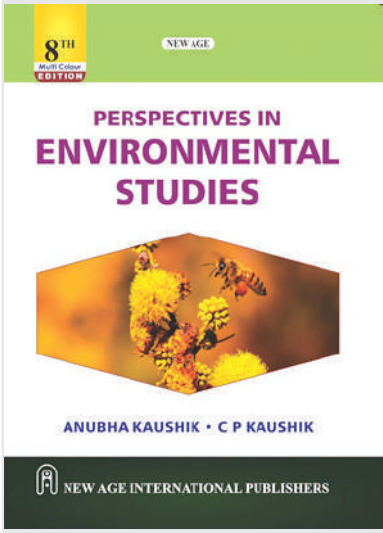
Emerging local and global environmental issues, Waste Management-Municipal, Industrial. Biomedical, hazardous and radioactive waste management, Waste-water treatment.

UNIT-2

ENVIRONMENTAL HEALTH AND SAFETY:

Occupational health and hygiene, Toxicity studies (Heavy metal toxicity, Tobacco, Silicosis, Xenobiotics and Carcinogenicity) and its remedy.

UNIT-3



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ADVANCED TECHNIQUES IN POLLUTION CONTROL:

Pollution control devices -Catalytic converters, Electrostatic precipitators, Scrubbers, Cyclonic separators, Gravitational settling chambers, Carbon capture technology, Water pollution technologies- membrane filtration, bioremediation, Bio manipulation technology.

PRACTICES AND FIELD PROJECT:

- Comparative analysis of water quality metrics to determine whether the water is suitable for irrigation and drinking purposes.
- Survey of flora and fauna in your own remote areas for assessment of local Biodiversity.
- Comparative study of traditional versus modern waste collection systems.
- Study on the effects of household items and detergents on the quality of the water.
- Detailed study of any environmental problem/situation, Identification of factors pertaining to that problem with conclusion.
- Study of agricultural runoff in crop lands of Angalakuduru and Sekuru.

COURSE OUTCOMES:

Upon successful completion of the course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Mapping with POs
1	Ability to apply knowledge, research skills and field techniques to protect environment.	Apply	2, 6, 9, 11
2	Examine the impacts of ecosystems, biodiversity and apply conservation strategies to curb the issues for sustainability	Apply	2, 6,9, 11
3	Survey on various waste management approaches and develop innovative solutions to solve the issues in the future	Evaluate	2, 3, 6,11
4	Create and implement useful skills to solve occupational health and environmental issues, ensuring safer work places and healthier communities	Apply	2,3, 6, 11
5	Analyse, design and implementation of sophisticated control system to manage industrial emissions and manage environmental pollutants	Analyse	1,2 3, 6,11

MAPPING OF SUSTAINABLE DEVELOPMENT GOALS (SDGS) AND INDIAN KNOWLEDGE SYSTEM (IKS):

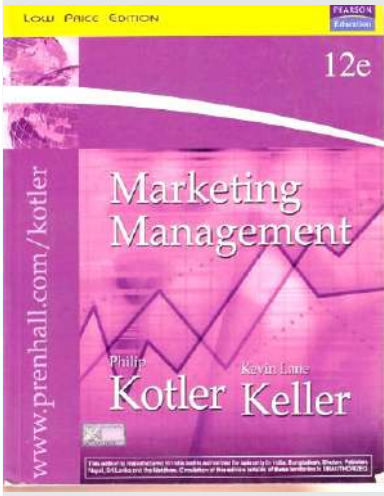
TEXTBOOKS:

1. Anubha Kaushik and C. P. Kaushik, “Perspectives in Environmental Studies”, 8th edition, New Age International Publishers, 2024.
2. M. Anji Reddy, “Textbook of Environmental Science and Technology” B. S. Publications, 2023.

REFERENCE BOOKS:

1. B. Joseph, “Environmental Studies Simplified”, 3rd edition, Mc Graw Hill Education (India), 2024.
2. John Pichtel, “Waste Management Practices: Municipal, Hazardous, and Industrial”, 2nd Edition, Taylor and Francis Books India Pvt. Ltd, 2024.
3. Pankaj Gupta,” Environmental Health and Occupational Safety”. 1st Edition, Routledge Taylor and Francis group, 2024.
4. C. S. Rao, “Environmental Pollution Control Engineering”, New Age International Publishers, 2021
5. P.D. Sharma, “Ecology and Environment”,13th Edition, Rastogi publication, 2022.
6. Anil Kumar De, “Environmental Chemistry”, 10th Edition, New Age International Private Limited, 2022.

22MS101 MANAGEMENT STUDIES



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Hours Per Week :

L	T	P	SL	C
2	2	0	2	3

PREREQUISITE KNOWLEDGE: Management Fundamentals, Operations Management, Business Environment.

COURSE DESCRIPTION AND OBJECTIVES:

This course aims to provide foundational knowledge in the science of management by examining classical and modern management theories and their applications in business operations, HR, and marketing. The course equips students with tools to analyse markets, customers, and internal organizational processes, thereby enabling them to develop effective managerial strategies.

MODULE-1

UNIT-1 **12L+12T+0P+12SL=36 Hours**

INTRODUCTION TO MANAGEMENT:

Concepts of Management and Organization – Nature, Importance and Functions – Evolution of Management Thought: Taylor's Scientific Management, Fayol's Principles, Administrative Theory, Mayo's Experiments. Theories of Motivation: Maslow and Herzberg. Leadership Styles. Corporate Social Responsibility from Indian Perspectives.

UNIT-2

OPERATIONS MANAGEMENT:

Plant Location Principles, Plant Layout Types, Productivity Measures, Project Management – Planning, Scheduling and Controlling, Inventory Control Techniques – EOQ, ABC Analysis, Stores and Purchase Management.

PRACTICES

- Design a management strategy for a Start-up using planning, organizing, leading, controlling.
- Conduct a leadership style analysis comparing crisis vs. stability periods.
- Prepare a CSR initiative aligned with Indian ethics and practices.
- Create a simplified Gantt chart for a semester project schedule.
- Compute EOQ for a sample product with demand, ordering, and holding cost data.
- Simulate inventory classification using ABC analysis for a retail store.
- Demonstrate statistical process control using chart data sets.
- Evaluate functions of management through a case study of a real-life business.

MODULE – II

UNIT-1 **18L+18T+0P+18SL=54 Hours**

HUMAN RESOURCE MANAGEMENT:

Concepts and Functions of HRM – Manpower Planning – Recruitment & Selection – Training & Development – Wage & Salary Administration – Promotion, Transfer and Separation – Performance Appraisal – Grievance Handling – Welfare Measures – Job Evaluation and Merit Rating, ***Ancient Gurukul systems,*** mentorship models, values-based leadership.

SKILLS:

- ✓ *Strategic Thinking and Managerial Decision-Making.*
- ✓ *Human Resource Planning and Administration*
- ✓ *Application of Operations and Inventory Techniques.*
- ✓ *Marketing Analysis and Digital Campaign Planning.*
- ✓ *Ethical and Sustainable Business Practices.*

UNIT-2

MARKETING MANAGEMENT:

Evolution and Functions – Selling vs. Marketing – 4Ps & 7Ps of Marketing – Product Mix & Life Cycle – Price Mix & Pricing Methods – Place Mix & Channels – Promotion Mix Tools – Packaging & Process in Marketing.

UNIT-3

EMERGING TRENDS IN BUSINESS MANAGEMENT:

Digital Transformation in Business – Role of AI in business, Remote & Hybrid Work Models, Digital Marketing Innovations, FinTech & Digital Payments, E-Commerce & Social Commerce.

PRACTICES:

- Draft a job description and specification for a chosen designation.
- Prepare an HR training calendar for a small business.
- Design a grievance handling mechanism with a workflow.
- Conduct a mock interview and document evaluation criteria.
- Analyze the marketing mix for a consumer product or service.
- Conduct a class debate on: "Is Digital Marketing replacing Traditional Marketing?"
- Analyze an Indian e-commerce platform's business model (e.g., Flipkart, Nykaa).
- Compare and contrast HR practices across two industry sectors.

COURSE OUTCOMES:

Upon successful completion of the course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Mapping with POs
1	Analyze core management principles and classical theories	Analyze	1,2
2	Apply operations management techniques	Apply	1,2,3
3	Evaluate human resource management practices	Evaluate	1,2
4	Evaluate the markets, customers and competition	Evaluate	1,2,3
5	Critically assess emerging trends such as digital transformation	Apply	1,2,3

MAPPING OF SUSTAINABLE DEVELOPMENT GOALS (SDGS) AND INDIAN KNOWLEDGE SYSTEM (IKS):

TEXTBOOKS:

1. Kotler Philip & Keller Kevin Lane, Marketing Management, 12th edition, PHI, 2005.
2. Koontz & Weihrich, Essentials of Management, 6th edition, TMH, 2005.
3. Aryasri, Management Science, 4th edition, TMH, 2004.

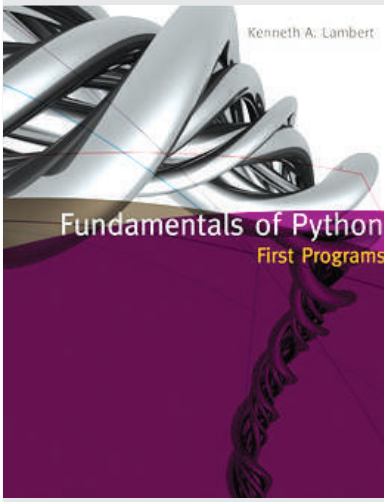
REFERENCE BOOKS:

1. Stoner, Freeman, Gilbert, Management, 6th edition, Pearson Education, 2018.
2. Thomas N. Duening & John M. Ivancevich, Management: Principles and Guidelines, Biztantra, 2003.

22CS102 PROBLEM SOLVING THROUGH PYTHON

Hours Per Week :

L	T	P	SL	C
2	0	2	2	3



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PREREQUISITE KNOWLEDGE: Prior knowledge of any programming language and object-oriented concepts is helpful but not mandatory.

COURSE DESCRIPTION AND OBJECTIVES:
This course offers sufficient knowledge required to understand the fundamental concepts of Python programming language. This course enables students to choose appropriate data structures (lists, dictionaries, tuples, sets, strings) for the given problem. In addition, the students will be able to create reliable, modular and reusable applications using Object- Oriented Programming approaches. At the end they will get an idea of how to access database using python programming, develop web applications, and using web Services using python Programming.

MODULE-1

UNIT-1 **12L+0T+12P+12SL=36 Hours**

INTRODUCTION:
Introduction to python, Variables, Assignment, Keywords, Built-in functions, Indentation, Comments, Basic data types - integers, float, complex, Boolean, strings; Python program development, running python using REPL shell, Python scripts.
Operators and Expressions: Operators- arithmetic operators, comparison (relational) operators, assignment operators, logical operators, bitwise operators, membership operators, identity operators; Expressions and order of evaluations.
Control Structures: Conditional control structures - if, else if, else; Loop control structures - for, while, for... else, while…else, nested loops, break, continue, pass.
Structured rule-based logic as in ***Panini's grammar;*** algorithmic thinking in ***Nyaya philosophy.***

UNIT-2

PYTHON DATA STRUCTURES AND FUNCTIONS:
Data Structures: Lists, Tuples, Sets, Strings, Dictionary - creation, accessing, basic operators and methods; List comprehensions.
Functions: Defining functions, calling functions, Passing arguments - keyword arguments, default arguments, positional arguments, variable-length arguments; Types of functions- anonymous functions, fruitful function, recursive functions; Scope of the variables- global and local variables, Development of recursive and non-recursive functions.
Recursive and modular thinking in Vedic systems; structured data modeling akin to Ayurveda and traditional knowledge.

MODULE-2

UNIT-1 **18L+0T+18P+18SL=54 Hours**

MODULES, PACKAGES AND OOPS:
Creating modules, Import Statement, From...Import Statement, Name Spacing, Creating user defined modules.
Standard Modules: sys, math, date, time, os, random and itertools modules.
Packages: Package Initialization, Importing * From a Package, Sub packages.
Modular organization of knowledge in Indian philosophical schools; abstraction in ancient systems like ***Arthashastra.***

UNIT 2

OBJECT ORIENTED PROGRAMMING:

Classes and Objects, Attributes and Methods, Constructors and Destructors- (init and del methods), Encapsulation - bundling of data and methods within a class, promotes data integrity and prevents unauthorized access, use of access modifiers to control access to attributes and methods; Inheritance, Method Overriding, Polymorphism, Abstraction, Class and Instance Variables - Differentiate between class variables (shared among all instances) and instance variables (unique to each instance), Access Modifiers-access modifiers and their role in controlling access to class members.

Operator Overloading: customization of operators for user- defined classes- define methods such as add, sub, mul, etc.

Traditional agricultural methods (Krishi-Parashara), Ayurveda-based healthcare practices.

UNIT-3

ERRORS AND EXCEPTIONS AND FILES:

Introduction to Exceptions, Handling Exception, Try Except Else and Finally Block, Raising Exceptions. File Processing: Reading and writing files -creating a new file, writing to a file, reading text files, opening and closing files, reading, writing, tell (), seek (), rename ().

Risk assessment in ancient Indian governance (Arthashastra); traditional knowledge documentation and preservation.

COURSE OUTCOMES:

Upon successful completion of the course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Mapping with POs
1	Analyze various features of programming language and their application in problem solving in computer programming to write, compile, and debug programs in python language.	Analyze	1,2
2	Make use of different data types to design programs involving decisions, loops, and functions.	Apply	1,2,5
3	Analyze the usage of different data structures for practical and contemporary applications for a given problem.	Analyze	1, 2, 3, 5
4	Choose appropriate programming paradigms, interrupt and handle exceptions using files to propose solution through reusable modules	Apply	1, 2, 3,5
5	Develop applications for a range of problems using object-oriented programming techniques.	Apply	1, 2,3,4,5

MAPPING OF SUSTAINABLE DEVELOPMENT GOALS (SDGS) AND INDIAN KNOWLEDGE SYSTEM (IKS):

TEXTBOOKS:

1. Kenneth A. Lambert, “The Fundamentals of Python: First Programs”, Cengage Learning, 2011.
2. Mark Lutz, “Learning Python”, 5th edition, Orielly Publishers, 2013.
3. Reema Thareja, ‘Python Programming using problem solving approach”, oxford university press,2017.

REFERENCE BOOKS:

1. Introduction to Computation and Programming Using Python. John V. Guttag, The MIT Press.
2. James Payne, “Beginning Python using Python 2.6 and Python 3”, Wrox publishing.
3. Paul Gries, “Practical Programming: An Introduction to Computer Science using Python 3”, The Pragmatic Bookshelf, 2nd edition, 4 Oct. 2013.
4. Allen B. Downey, “Think Python”, 1st edition, Orielly publishing.

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22EN104 TECHNICAL ENGLISH COMMUNICATION

Hours Per Week :

L	T	P	SL	C
1	0	2	1	2

PREREQUISITE KNOWLEDGE: Basic sentence formation, understanding contextual meanings, basic writing skills and moderate fluency in English.

COURSE DESCRIPTION AND OBJECTIVES:
In this course students will read, analyze, and interpret material from technical and general fields, and practice reading, writing, listening and speaking skills to gain exposure and functional English on a variety of contemporary topics. The overall course objective is to provide English for Specific Purposes(ESP) instruction to enhance students' reading, writing, listening and speaking skills through a practice in the language. It will aim to build students' confidence and motivation through exposure to academic skills like Note making/taking, Paraphrasing, Summarizing, Report Writing, Making Presentations etc., so as to generate interest in the language from an ESP perspective. Finally, students are expected through the course to gain key strategies and expression for communicating with professionals and non- specialists.

MODULE-1

UNIT-1 **6L+0T+12P+6SL= 24Hours**

EFFECTIVE COMMUNICATION: EXPLORING CHANNELS AND METHODS:

Sub-themes: Types of communication, non-verbal communication, communication strategies and Barriers of communication, digital communication tools.

*IKS- Traditional Communication Methods in Ancient India and the ***Gurukul system*** emphasized face-to-face communication, clarity in speech, and respectful dialogue.

Vocabulary Building: Roots, Prefixes and Suffixes-commonly used 50.

Grammar: Articles and Prepositions.

Reading: Skimming and scanning for information.

Writing: Paragraph Writing, Summarizing.

Listening: Note Making, Note Taking.

Speaking: Introducing One- self.

UNIT- 2

A NEW ERA OF HEALTH CONSCIOUSNESS: IN PURSUIT OF BETTER HEALTH:

Sub-themes: Importance of physical and mental well-being, benefits of healthy lifestyle choices, current health trends.

*IKS- "Traditional Indian Approaches to Health and Well-being"

Vocabulary Building: Homophones and Homonyms (commonly Miss spelt Words).

Grammar: Tenses.

Reading: Reading for specific details – Reasons.

Writing: Process Description.

Listening: Listening for main ideas and supporting details on health topics.

Speaking: Object Description (JAM).

PRACTICES:

- Note making and Note Taking.
- Summarizing.
- Paragraph Writing.
- Reading Comprehension
- Error Correction and Restructuring.
- Vocabulary building.
- Process Description.
- Tenses.

SKILLS:

- ✓ *Apply different sub-skills like skimming, scanning, reading for information, reading for inference etc. to understand different kinds of text.*
- ✓ *Apply different sub skills like top down, bottom up approaches to listening.*
- ✓ *Use functional vocabulary relevant to engineering and technology to express ideas lucidly.*
- ✓ *Use appropriate sentence structure, cohesive devices to construct simple text in regular correspondence like e-mails and letters.*

MODULE-2

UNIT-1 **9L+0T+18P+9SL= 36Hours**

DISRUPTIVE TECHNOLOGIES: ETHICAL IMPLICATIONS AND FUTURE PROSPECTS:

Sub-themes: Introduction to artificial intelligence, machine learning, Augmented and Virtual Realities, AI in different sectors, Colonizing the Space and Cloning, ethical implications of AI, future prospects.

Vocabulary Building: Idioms and Phrases

Grammar: Subject-Verb Agreement

Reading: Reading for Tone, intention and Irony for Global understanding

Writing: Paraphrasing, Letter Writing

Listening: Listening for main ideas

Speaking: JAM

UNIT-2

ENTREPRENEURSHIP AND START-UP CULTURE: EMERGING TRENDS:

Sub-themes: Startup ecosystem, emerging industries, the role of technology in entrepreneurship, global market trends.

Vocabulary Building: Words Confused

Grammar: Active and Passive Voice

Reading: Reading for specific details

Writing: E-mail Etiquette, Data Interpretation, Report Writing

Listening: Note Making from a Long Lecture

Speaking: Group Discussion

UNIT-3

ETHICAL LEADERSHIP: INTEGRATING SOCIAL RESPONSIBILITY AND CORE VALUES:

Sub-themes: Corporate social responsibility (CSR), ethical business practices, environmental responsibility.

Principles of Dharma and Leadership in Ancient Indian Thought

Vocabulary Building: Homo Phones-Spellings (commonly Miss Spelt Words).

Grammar: Synthesis – use of coordinating and subordinating Conjunctions.

Reading: Reading for tone, intention and irony.

Writing: Report Writing, Reviews and Social Media Messaging-Etiquette.

Listening: Listening for main ideas and supporting details on health topics.

Speaking: Team Presentations

PRACTICES:

- E-mail writing.
- Letter writing.
- Paraphrasing
- Report writing.
- Process Description.
- Data Interpretation.
- Messaging in Social media.
- Writing Reviews.
- Group Discussion.

COURSE OUTCOMES:

Upon successful completion of the course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Mapping with POs
1	Apply a variety of strategies to interpret and comprehend spoken texts/discourse using contextual clues.	Apply	6, 7, 8, 9, 10, 11
2	Apply appropriate reading strategies to interpret content / material related to engineering and technology domain.	Apply	6 7, 8, 9, 10, 11
3	Participate in discussions and make short presentations on general and technical topics.	Analyze	6 7, 8, 9, 10, 11
4	Possess an ability to write clearly on topics related to technology and workplace communication.	Evaluate	6 7, 8, 9, 10, 11
5	Choose functional language, grammar structures, cohesive devices and skills of organization to express clearly in speaking.	Create	6, 7, 8, 9, 10, 11

MAPPING OF SUSTAINABLE DEVELOPMENT GOALS (SDGS) AND INDIAN KNOWLEDGE SYSTEM (IKS):

TEXTBOOK:

1. Tabitha Chekuri & Ravi Perimulla, INGENUITY: A Course Book on Technical English Communication, Cengage Learning, 2025.

REFERENCE BOOKS:

1. Balasubramanian T, “A Text book of Phonetics for Indian Students”, Orient Longman, New Delhi, 1989.
2. Krishnaswamy, N and Sriraman, T, “Current English for Colleges”, Trinity publications, 2016.
3. Ashraf Rizvi M, “Effective Technical Communication”, 2nd Edition, McGraw Hill Education, 2017.

22CY101 CYBER SECURITY

Hours Per Week :

L	T	P	SL	C
0	1	1	0	1

PREREQUISITE KNOWLEDGE: Basic familiarity with computers, internet usage, mobile apps, and fundamental digital communication concepts.

COURSE DESCRIPTION AND OBJECTIVES:

This course offers a broad overview of cybersecurity, designed for students from all engineering disciplines. It introduces the basic concepts of security, threats, and preventive practices in the digital world. Students will learn cyber hygiene, common attack vectors, legal and ethical considerations, and safe digital practices applicable to personal and professional environments.

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MODULE-1

UNIT-1 **0L+6T+6P+0SL = 12 Hours**

INTRODUCTION TO CYBERSECURITY:

Cybersecurity: Definition and Goals, Scope and Importance in Modern Society, Threat landscape: Statistics and recent real-life cyber-attacks, Basics of Information Security: Confidentiality, Integrity, and Availability (CIA Triad).

UNIT-2

TYPES OF CYBER ATTACKS:

Malware (Viruses, Worms, Trojans, Ransomware), Phishing, Spoofing, Denial of Service (DoS/DDoS), Man-in-the-middle (MitM), SQL Injection, Zero-day attacks, Social engineering attacks.

MODULE-2

UNIT-1 **0L+9T+9P+0SL = 18 Hours**

CYBER SAFETY AND BEST PRACTICES:

Password protection and Multi-Factor Authentication, Safe browsing habits and email hygiene, Mobile device security, Secure use of social media platforms, Safe use of public Wi-Fi.

UNIT-2

CYBER LAWS AND ETHICS:

Overview of Indian IT Act 2000 & amendments, Digital signature, cyber-crime laws, Data Privacy & GDPR, Cyber ethics & responsible digital behaviour.

UNIT-3

THREATS, ATTACKS, AND VULNERABILITIES:

Online Threat Vectors: Web, Email, USB, Social Media, Introduction to Vulnerabilities and Risk Concepts, Case Studies: Real-world Cyber Attacks.

SKILLS:

- ✓ *Awareness of common cyber threats and online risks.*
- ✓ *Ability to identify phishing, fraud messages, and unsafe links.*
- ✓ *Practice of strong password habits and secure digital behaviour.*
- ✓ *Understanding of real-world cybercrime scenarios.*

PRACTICES:

- Working of phishing emails.
- Secure password creation.
- Browser settings and privacy tools.
- Use of antivirus/firewalls/Two-Factor Authentication (2FA).
- Introduction to tools like Wireshark, Burp Suite demo.
- Cybercrime reporting portal walk-through.

COURSE OUTCOMES:

Upon successful completion of the course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Mapping with POs
1	Understand and apply the fundamentals of cybersecurity and cyber threats.	Apply	1,2,6,8
2	Identify and explain common cyber threats and personal protection techniques.	Apply	1,2,3,4,6
3	Demonstrate safe browsing, secure communication practic-es, and recognize scam patterns.	Apply	2,3,4,6,8
4	Appreciate the role of cybersecurity across different fields and in daily personal use.	Apply	1, 2, 3,5

MAPPING OF SUSTAINABLE DEVELOPMENT GOALS (SDGS):

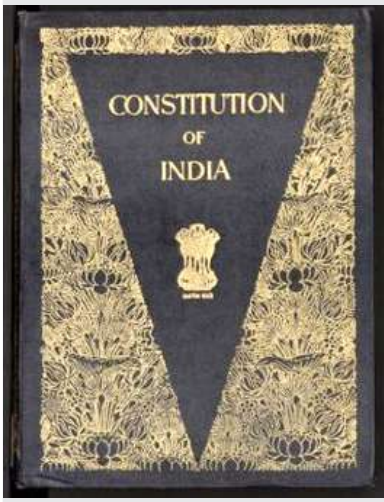
TEXTBOOK:

1. EC-Council, “Cybersecurity Essentials”, Cengage Learning, 2021.

REFERENCE BOOKS:

1. Nina Godbole & Sunit Belpure, “Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives”, Wiley India.
2. James Graham, “Introduction to Cyber-Warfare: A Multidisciplinary Approach”, Syngress.
3. Peter W. Singer & Allan Friedman, “Cybersecurity and Cyberwar: What Everyone Needs to Know”, Oxford University Press.

22SS101 CONSTITUTION OF INDIA



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Hours Per Week :

L	T	P	SL	C
0	2	0	0	1

PREREQUISITE KNOWLEDGE: Nil

COURSE DESCRIPTION AND OBJECTIVES:

This foundational course introduces students to the basic philosophy and functioning of the Indian Constitution. It explores constitutionalism, fundamental rights, duties, directive principles, and the organization of the Indian state. Emphasis is placed on participatory democracy, local self-governance, and ethical foundations using insights from Indian Knowledge Systems (IKS) and alignment with Sustainable Development Goals (SDGs).

MODULE-1

UNIT-1 **0L+12T+0P+0SL=12 Hours**

Historical Background to the Indian Constitution- Meaning of Constitution, Constitutional Law and Constitutionalism- Historical evolution: colonial legacy to the Constituent Assembly- Salient features and values of the Indian Constitution, Rajadharma, Sabha–Samiti traditions of governance, Peace, Justice, and Strong Institutions.

UNIT-2

Fundamental Rights, Duties, Directive Principles, and Amendments-- Right to Equality, Freedom, and Life-- Directive Principles of State Policy- Fundamental Duties: relevance and legal status- Amendment procedure and Basic Structure Doctrine, Dharma & Nyaya principles in ***Manusmriti & Arthashastra,*** Reduced Inequality; Peace, Justice and Strong Institutions.

PRACTICES:

- Skit or role-play on framing the Preamble using Sabha–Samiti models.
- Group discussion: Comparison of Fundamental Duties with Dharma-based duties.
- Poster making: Timeline of Indian Constitutional development.

MODULE - 2

UNIT-1 **0L+18T+0P+0SL=18 Hours**

Structure and Form of Government- Federalism: Centre-State Power Distribution-Parliamentary Form of Government- Emergency Provisions: Sabha advisory traditions; checks and balances.

UNIT-2

Local Self-Government- 73rd and 74th Constitutional Amendments- Panchayats and Municipalities- Participatory democracy and grassroots governance: Gram Sabha, Panchayat Raj in Vedic and Smriti texts: Sustainable Cities and Communities.

UNIT-3

Constitution and Contemporary Citizenship- Importance of the Constitution in everyday life- Digital citizenship and democratic awareness- Rights of marginalized and vulnerable groups- Civic duties, RTI, electoral literacy: Duty-based ethics; community participation traditions- Gender Equality.

SKILLS:

- ✓ *Understand foundational constitutional principles and values.*
- ✓ *Identify and apply rights and duties in every-day civic life.*
- ✓ *Analyze government structure and local governance mechanisms.*

PRACTICES:

- Mock Gram Sabha or Ward Committee meeting.
- RTI Application writing workshop.
- Constitution Quiz based on rights and duties.

COURSE OUTCOMES:

Upon successful completion of the course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Mapping with POs
1	Implement the core principles and features of the Indian Constitution in real- life civic and democratic situations.	Apply	6
2	Dissect the significance of Fundamental Rights, Duties, and Directive Principles in promoting constitutional morality.	Analyze	6,7
3	Differentiate the roles of constitutional institutions and intergovernmental relations in sustaining India's federal framework.	Analyze	6,7
4	Evaluate the performance of the Indian Constitution in upholding democratic values and social justice.	Evaluate	6,7

MAPPING OF SUSTAINABLE DEVELOPMENT GOALS (SDGS) AND INDIAN KNOWLEDGE SYSTEM (IKS):

TEXTBOOK:

1. B.R. Ambedkar – The Constitution of India, Educreation Publishing, 2020.

REFERENCE BOOKS:

1. P.M. Bakshi – The Constitution of India, Universal Law Publishing, 15th Ed.
2. Subhash Kashyap – Our Constitution, National Book Trust, 2011.
3. Arun Thiruvengadam – The Constitution of India: A Contextual Analysis, Hart, 2017.
4. Constituent Assembly Debates – Lok Sabha Secretariat.
5. Arthashastra (Kautilya) – Translations on governance.
6. Manusmriti (Select chapters on duties and justice).

22SA103 PHYSICAL FITNESS

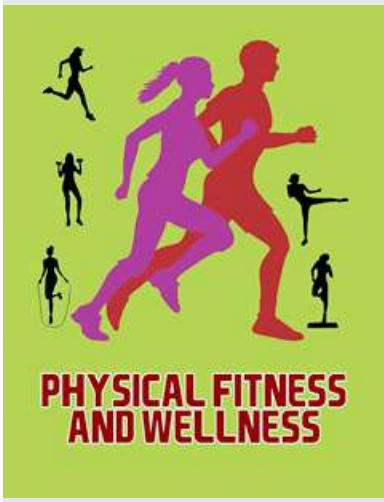
Hours Per Week :

L	T	P	SL	C
0	0	2	0	1

PREREQUISITE KNOWLEDGE: Nil

COURSE DESCRIPTION AND OBJECTIVES:

This course offers students a structured approach to improve their physical fitness and mental wellness using evidence-based exercise science and traditional yogic wisdom. It emphasizes developing strength, endurance, flexibility, and emotional balance, and encourages students to incorporate lifelong wellness habits.



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MODULE-1

UNIT-1 **0L+0T+12P+0SL = 12 Hours**

FUNDAMENTALS OF PHYSICAL FITNESS:

Health-related and skill-related fitness components, Fitness assessment techniques and health screening, Posture and gait analysis.

UNIT-2

ASSOCIATING:

Endurance training methods – HIIT, continuous running, basic circuit training, Strength training using bodyweight and resistance, Importance of core stability and functional fitness, Injury prevention and recovery basics.

PRACTICES:

- Warm-up and mobility exercises, Stretching exercises.
- Running ABC Exercises.
- Speed Training - Short Sprints (30 Meter Run), Shuttle Runs.
- 400 Meters run, 100 Meters run.
- Bodyweight strength circuit (Sit- Ups and Push-Ups).
- Endurance (running/jogging/skipping).
- Static & dynamic stretching.
- Postural correction activities.

MODULE-2

UNIT-1 **0L+0T+18P+0SL = 18 Hours**

FLEXIBILITY, STRENGTH & COORDINATION:

Static and dynamic stretching, Balance drills and neuromuscular coordination, Plyometric and agility ladder exercises, Integration of yoga practices for cool-down.

UNIT-2

NUTRITION, RECOVERY & FITNESS HABITS:

Basics of sports and yogic nutrition, Macronutrients, hydration, meal planning, Role of sleep and active recovery, Fitness myths and self-monitoring.

SKILLS:

- ✓ *Improved strength, endurance, and flexibility.*
- ✓ *Understanding of fitness principles.*
- ✓ *Discipline and goal-setting.*
- ✓ *Teamwork and communication.*

UNIT-3

YOGA PRACTICES FOR WELLBEING:

Asanas (10–15) for flexibility, balance, and spine health, Pranayama: Anulom-Vilom, Bhramari, Kapalabhati, Meditation: Breath focus, Om chanting, Yoga Nidra and relaxation techniques.

PRACTICES:

- Guided Sukshma Vyayam and Asana sequences.
- Meditation.
- Yoga Nidra.
- Nutrition logging.
- Breath-focused mindfulness activities.
- Group Reflections.

COURSE OUTCOMES:

Upon successful completion of the course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Describe the physiological effects of exercise on the body systems.	Apply	1	7,8,9,10,11
2	Apply the FITT (Frequency, Intensity, Time, Type) principle to personal fitness plans.	Apply	1	7,8,9,10,11
3	Assess personal fitness levels through various fitness tests.	Analyze	2	7,8,9,10,11
4	Evaluate progress toward personal fitness goals and make adjustments as needed.	Evaluate	2	7,8,9,10,11
5	Construct a lifestyle plan that integrates regular physical activity for long-term health and fitness.	Create	2	7,8,9,10,11

MAPPING OF SUSTAINABLE DEVELOPMENT GOALS (SDGS) AND INDIAN KNOWLEDGE SYSTEM (IKS):

22SA104 LIFE SKILLS

Hours Per Week :

L	T	P	SL	C
0	0	2	0	1

PREREQUISITE KNOWLEDGE: Nil

COURSE DESCRIPTION AND OBJECTIVES:

This course offers orientation in life skills. Its objective is to acquaint students with the social and inter-personal skills that will enable them to cope with the constantly changing environment. Developing general self-awareness & self-expression.

KUCHIPUDI

MODULE-1

0L+0T+12P+0SL = 12 Hours

Origin of dance according to Natya Shastra, 1-10 Asamyukta hastaalu, 11-20 Asamyukta hastaalu.

MODULE-2

0L+0T+18P+0SL = 18 Hours

21-28 Asamyukta hastaalu, Chaturvidha Abhinayaalu,1-12 Samyukta hastaalu, 13-24 Samyukta hastaalu, Pancha jaatulu, Rasa theory, Classical dance forms of India.

WESTERN DANCE

MODULE-1

0L+0T+12P+0SL = 12 Hours

Basic of Freestyle dancing, Understanding the Rhythm.

MODULE-2

0L+0T+18P+0SL = 18 Hours

Adapting the basic steps to different music's, Assignments – using same choreography routines to different tracks.

CARNATIC MUSIC

MODULE-1

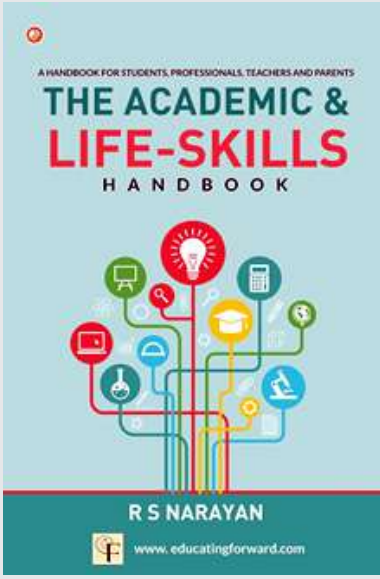
0L+0T+12P+0SL = 12 Hours

Basics of carnatic music, Sarali swarali 3 speeds, Akaara sadhana, Janta swaralu introduction, Importamce of Raag, Taal and about different instruments.

MODULE-2

0L+0T+18P+0SL = 18 Hours

Bhadrachala ramadasu keertanalu, Composing a song, Sing along with karaoke, Popular writers compositions from different languages, Students should do project about music and a famous person related to music.



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SKILLS:

- ✓ *Bouncing back from setbacks and adversity.*
- ✓ *Thinking outside the box to generate new ideas.*
- ✓ *Discipline and goal-setting.*
- ✓ *Teamwork and communication.*

PUBLIC SPEAKING

MODULE-1

0L+0T+12P+0SL = 12 Hours

Introduction to Public Speaking, Informative Speaking, Listening Effectively.

MODULE-2

0L+0T+18P+0SL = 18 Hours

Organizing and Outlining, Delivering Your Speech, Introductions and Conclusions, Critical Thinking and Reasoning.

PAINTING

MODULE-1

0L+0T+12P+0SL = 12 Hours

Free hand outlines drawing on the basis of creativity, originality and individuality.

MODULE-2

0L+0T+18P+0SL = 18 Hours

Memory drawings on various topics like games, festivals, animal study and daily life of society, Still Life with light and shade, Nature study like Landscape, waterfall and Forests etc.

YOGA

MODULE-1

0L+0T+12P+0SL = 12 Hours

Introduction to Yoga, Introduction to Yogasana Sports, Brief History of Yoga, Types, schools of Yoga, Sun salutations Variations.

MODULE-2

0L+0T+18P+0SL = 18 Hours

Yoga for Stress, Introduction to Astanga Yoga, Introduction to classical texts of Yoga, Yogic Diet, Yoga Nidra, Introduction to Meditation, Yoga for Sports, Injury Management with Yoga, Introduction to Yoga therapy, Yoga for weight loss, Diabetes.

COOKERY

MODULE-1

0L+0T+12P+0SL = 12 Hours

Preparation of Bread Halwa, Flavoured Milk, Veggie soups, Herbal Tea.

MODULE-2

0L+0T+18P+0SL = 18 Hours

Fritters, Rasagulla, Onion Samosa, Soya Nuggets, Dhokla, Cutlet.

VIDEO EDITING

MODULE-1

0L+0T+12P+0SL = 12 Hours

Necessity & Principles of Editing, Editing for the genre, Film Appreciation, Digital Filmmaking.

MODULE-2

0L+0T+18P+0SL = 18 Hours

Post Production Tools, Film Editing Styles, Audio Editing and Production, Enhancing Video with Color Grading, Advanced editing techniques, Motion Graphics & Video Editing Portfolio Development.

GERMAN

MODULE-1

0L+0T+12P+0SL = 12 Hours

Alphabet, numbers, greetings, geschwister.

MODULE-2

0L+0T+18P+0SL = 18 Hours

Familie,wo wohnen sie, nachbharn von familie wiegel, inline skaten, wetter, fernsehen, Hobbies.

FRENCH

MODULE-1

0L+0T+12P+0SL = 12 Hours

Pour saluer, Les jours de la semaine, Les mois de l' année.

MODULE-2

0L+0T+18P+0SL = 18 Hours

Les nombres, Décrire l'heure, Les verbes être,avoir et aller, Les nationalités, Les professions, Les fruits et les legumes, Les adjectifs pour décrire une person.

PHOTOGRAPHY

MODULE-1

0L+0T+12P+0SL = 12 Hours

Introduction to Photography, Photography Evolution, Different types of Nature lights.

MODULE-2

0L+-0T+18P+0SL = 18 Hours

DSLR Parts and Types of DSLR's, Anatomy of Camera and Lenses, Types of Lenses, Photo framing, Image resolution, Exposure triangle.

APSSDC ELECTRICAL HOME

MODULE-1

0L+0T+12P+0SL = 12 Hours

Understanding and testing of live switch boards, DB distribution boards, Staircase wiring, complete wiring of 1 BHK, 2 BHK.

MODULE-2

0L+0T+18P+0SL = 18 Hours

Erection and maintenance of fan & tube light, Understanding the protection devices,20 Minutes timer, LDR with timer control, Impulse relay.

APSSDC ELECTRONICS HOME

MODULE-1

0L+0T+12P+0SL = 12 Hours

Understanding of series and parallel connection of bulbs.

MODULE-2

0L+0T+18P+0SL = 18 Hours

Working of ceiling fan, tubelight, mixer grinder, iron box.

BLOCK PRINTING

MODULE-1

0L+0T+12P+0SL = 12 Hours

Introduction to Kalamkari Painting, Tools and Materials for Kalamkari.

MODULE-2

0L+0T+18P+0SL = 18 Hours

Basic Techniques and Sketching for Kalamkari, Dyeing Techniques for Kalamkari Introduction to Block Printing, Block Printing Techniques and Final Projects.

HANDCRAFTS

MODULE-1

0L+0T+12P+0SL = 12 Hours

Plastic bottle with Shilpkar work, Paper craft for room decoration, Wall hanging with ice cream sticks.

MODULE-2

0L+0T+18P+0SL = 18 Hours

Table stand with cotton buds, 3D outline with bottle decoration, Thermocol work.

SELF DEFENSE BY TAEKWONDO

MODULE-1

0L+0T+12P+0SL = 12 Hours

Self Defense by Taekwondo- Side Wrist Grip Escape and Cross Wrist Grip escape, Side Wrist Grip - Arm Bar, Wrist Lock, Shoulder Lock.

MODULE-2

0L+0T+18P+0SL = 18 Hours

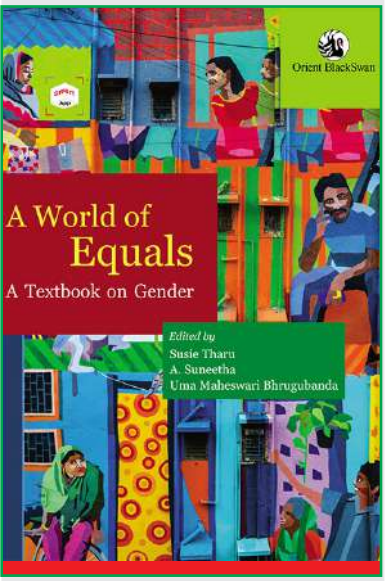
Double Wrist Grip Escape, Upper Double Grip Escape, Major Outer Reaping Throw, Major Hip Throw, One Arm Shoulder Throw.

COURSE OUTCOMES:

Upon successful completion of the course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Demonstrate proficiency in a variety of techniques	Apply	1	7,8,9,10,11
2	Identify, demonstrate and understand the structures and characteristics	Apply	1	7,8,9,10,11
3	Cultivate concentration, self-control, and emotional regulation.	Analyze	2	7,8,9,10,11
4	Demonstrate increased confidence and the ability to respond assertively and calmly in threatening situations.	Evaluate	2	7,8,9,10,11
5	Understand and apply sustainable and ethical practices.	Create	2	7,8,9,10,11

MAPPING OF SUSTAINABLE DEVELOPMENT GOALS (SDGS):



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22SA102 SELF-UNDERSTANDING AND GENDER SENSITIZATION

Hours Per Week

L	T	P	SL	C
0	0	2	0	1

PREREQUISITE KNOWLEDGE: Nil

COURSE DESCRIPTION AND OBJECTIVES:

To comprehend the dynamics of gender roles and relations within social and cultural contexts, and to evaluate legal and behavioral frameworks that promote gender equality and personal growth.

MODULE-1

0L+0T+12P+0SL=12 Hours

UNIT-1

UNDERSTANDING GENDER:

Concept of Gender: Distinction between Gender and Sex - Socialization and Gender Roles - Gender and Culture: Stereotypes and Social Conditioning - Gender-Based Violence: Forms, Impact and Prevention. ***Shakti philosophy, contributions of women in Vedas.***

Activity-Based Learning: Group discussions on gender roles in media - Role plays on gender stereotyping - Case study analysis of real-life incidents of gender-based violence

UNIT-2

GENDER LAWS AND RIGHTS:

Gender and Labour: Equal Pay, Workplace Harassment, Maternity Benefits - Legal and Constitutional Provisions for Gender Equality in India: Article 14, 15, 16, 39, and 42, POSH Act, Domestic Violence Act, Dowry Prohibition Act - Women's Rights and Human Rights Framework. ***Dharma-based equality, Sarvodaya philosophy.***

Activity-Based Learning: Legal case study presentations -Debate on gender justice and law implementation - Quiz on gender-related legal provisions

PRACTICES:

- Conduct a survey on gender roles and relations in the banking and IT sectors to assess employee attitudes and resistance to policy changes.
- Undertake a study to identify the impact of cultural perceptions on gender-based violence and its effects on workplace productivity.
- Analyze the characteristics and components of gender laws to evaluate their effectiveness in promoting labor rights and reducing gender discrimination.
- Perform a study on the determinants of gender roles and culture by reviewing media content and social norms to understand their influence on attitudes.
- Conduct a comparative analysis of constitutional and legal perspectives on gender equality to assess their impact on labor practices and gender sensitivity in various industries.

MODULE-2

0L+0T+18P+0SL=18 Hours

UNIT-1

SELF –EMPOWERMENT:

Self-awareness and Self-confidence -Building Personal Identity -Values and Ethics for Personal Growth - Goal Setting and Motivation.

Activity-Based Learning: Self-reflection journals - Vision board creation - Group sharing sessions

UNIT-2

PERSONALITY DEVELOPMENT SKILLS:

Types of Personality: Introvert, Extrovert, Ambivert - Good Manners and Professional Etiquette - Developing a Positive Attitude.

Activity-Based Learning: Role plays on etiquette, Personality-type assessment and group analysis, Positivity circles

UNIT-3

LIFE MANAGEMENT SKILLS:

Decision Making and Problem Solving - Interpersonal Communication Skills - Time and Stress Management - Conflict Resolution and Leadership.

Activity-Based Learning: Situational games for decision making, Time log and stress diary activity, Group project on conflict resolution strategies

PRACTICES:

- Survey on different personality types and their impact on workplace performance and team dynamics.
- Undertake a study on the effectiveness of etiquette training programs in improving professional interactions and workplace relationships.
- Analyze strategies for developing a positive attitude and their impact on employee engagement and job satisfaction.
- Conduct a study on time management practices and their influence on productivity and work-life balance.
- Perform a study on conflict management techniques and their effectiveness in resolving workplace disputes and improving team cohesion.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Mapping with POs
1	Analyze the influence of gender roles and cultural norms on individual behavior and social structures.	Analyze	6
2	Apply legal perspectives and gender laws to assess their impact on gender equality and labor rights.	Apply	6
3	Analyze various personality types and develop Strategies to apply good manners and etiquette in diverse settings.	Analyze	6
4	Apply decision-making and time management skills to enhance personal and professional effectiveness.	Apply	6
5	Analyze conflict management and leadership skills to effectively handle interpersonal and organizational Challenges.	Analyze	6

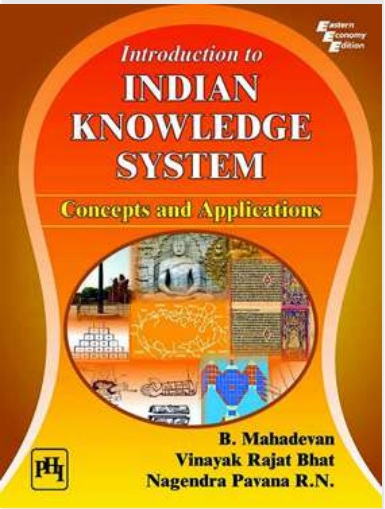
MAPPING OF SUSTAINABLE DEVELOPMENT GOALS (SDGs) AND INDIAN KNOWLEDGE SYSTEM (IKS) :

REFERENCE BOOKS:

1. A World of Equals: A Textbook on Gender, Susie Tharu, Uma Maheswari Bhrugubanda (2022), Orient Blackswan Pvt. Limited.
2. Chitra Chellam (2022), Personality Development, Sara Book Publication.

SKILLS:

- ✓ *Self Esteem Skills.*
- ✓ *Decision Making Skills.*
- ✓ *Problem Solving Skills.*
- ✓ *Team Building Skills.*
- ✓ *Interpersonal Skills.*
- ✓ *Leadership Skills.*



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22SS102 INDIAN KNOWLEDGE SYSTEMS

Hours Per Week :

L	T	P	SL	C
0	2	0	0	1

PREREQUISITE KNOWLEDGE: High School – level knowledge on Indian history and society.

COURSE DESCRIPTION AND OBJECTIVES:
The course introduces students to India's rich and diverse knowledge traditions and heritage. The profound insights, timeless wisdom, and diverse perspectives, originating from the ancient past have played a major role in shaping the country's cultural identity. The richness of India's intellectual heritage is vindicated by the existence of innumerable texts and thinkers in the country. By exploring India's knowledge traditions, the course aims to help students learn how the country's culture developed across the ages and to enable them look beyond conventional methods in finding solutions to scientific and technological issues.

MODULE-1

UNIT-1 **0L+12T+0P+0SL = 12 Hours**

INTRODUCTION TO INDIAN KNOWLEDGE SYSTEMS:
Definition, Scope, and Significance of IKS; Various Fields of Study in IKS (Science, Medicine, Arts, Linguistics, Philosophy, etc.); Key Texts and Sources of information for IKS: Vedic, Buddhist, Jain, and Other Traditions.

UNIT-2

PHILOSOPHICAL AND SCIENTIFIC FOUNDATIONS OF IKS:
Overview of Major Schools of Thought (Nyaya, Samkhya, Vedanta, etc.); Early Scientific and Technological Contributions (Mathematics, Astronomy, Medicine); Centers of Learning: Nalanda, Takshashila, and Others.

PRACTICES:

- Mapping IKS Disciplines – Create a chart or mind map showcasing various fields of study in IKS, including Science, Medicine, Arts, and Philosophy.
- Textual Exploration – Select and summarize insights from classical IKS texts (Vedas, Upanishads, Buddhist & Jain texts).
- IKS in Daily News – Collect newspaper articles on IKS-related discoveries (archaeological findings, indigenous technologies, art forms) and discuss their relevance.
- Field Visit/Virtual Tour – Explore ancient centers of learning like Nalanda and Takshashila (via museum visits, documentaries).
- Poster Display of Philosophers – Create visual profiles of prominent ancient philosophers (e.g., Charaka, Sushruta, Panini, Aryabhata).

MODULE-2

UNIT-1 **0L+18T+0P+0SL = 18 Hours**

DISCIPLINE-SPECIFIC INDIAN KNOWLEDGE SYSTEMS:
Role of IKS within the discipline (Science, Technology, or Law); Key Concepts and Applications within the discipline; Demonstration of IKS via real-life examples (Traditional Art, Architecture, and Indigenous Engineering Practices).

UNIT-2

RELEVANCE OF IKS IN THE MODERN WORLD:
Contributions of IKS to Global Knowledge Systems; Revival and Integration of IKS with Contemporary Science and Technology; Challenges and Opportunities in Preserving IKS.

UNIT-3

IKS AND SUSTAINABLE PRACTICES:
Indigenous Knowledge in Agriculture, Water Management, and Medicine; Environmental Ethics in Ancient Indian Traditions; Case Studies on Sustainable Development Using IKS.

PRACTICES:

- Discipline-Specific IKS Study – Research and present how IKS applies to law, governance, science, architecture, or technology.
- Exploring Indigenous Techniques – Engage in practical demonstrations of traditional knowledge such as Yoga, Meditation, Martial Arts (Karra Saamu), or Body Art.
- IKS Documentation Project – Collect and document indigenous knowledge traditions, such as traditional medicine, water harvesting, or agriculture.
- Awareness on Intellectual Property Risks – Use the internet to study indigenous intellectual properties that are at risk of international appropriation.
- Group Discussion on Challenges to IKS – Debate the modern relevance and challenges in preserving IKS, and propose solutions for its integration into science and technology.

COURSE OUTCOMES:
Upon successful completion of the course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Mapping with POs
1	Apply basic concepts of Indian Knowledge Systems to recognize their relevance in contemporary science, engineering, and society.	Apply	6, 11
2	Analyze selected indigenous practices in areas such as health, environment, water management, or architecture to understand their principles.	Analyze	6, 8, 9, 11
3	Evaluate the ethical and ecological values embedded in IKS and their relevance to sustainability and social responsibility.	Evaluate	6, 7
4	Develop an informed understanding of Indian Knowledge Systems by applying them in reflections, discussions, or illustrative examples.	Apply	6, 8, 9, 11

MAPPING OF SUSTAINABLE DEVELOPMENT GOALS (SDGS) AND INDIAN KNOWLEDGE SYSTEM (IKS):

TEXTBOOKS:

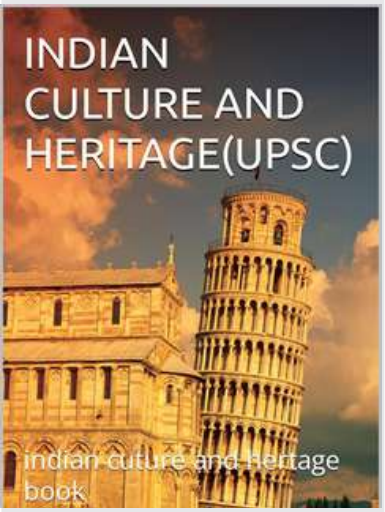
1. B. Mahadevan, Vinayak Rajat Bhat, Nagendra Pavana R. N., Introduction to Indian Knowledge System: Concepts and Applications, PHI Learning Private Limited, Delhi, 2023.
2. Mukul Chandra Bora, Foundations of Bharatiya Knowledge System, Khanna Book Publishing, 2023.

REFERENCE BOOKS:

1. Dhirendranath Banerjee and Sanjit Kumar Sadhukan (ed.), Ancient Indian Scientific Thought and Modern Theories: An Overview, National Mission for Manuscripts and D. K. Printworld, 2019.
2. Shaik Taufiq Khalil, Indian Knowledge System: Arthshastra by Kautilya, Notion Press, 2023.
3. Chauhan Bhag Chand, IKS: The Knowledge System of Bharata, Garuda Prakashan, 2023.

SKILLS:

- ✓ *Ability to analyze and evaluate Indian Knowledge System (IKS) practices in the context of modern challenges.*
- ✓ *Problem-solving skills through the application of IKS principles to contemporary issues.*
- ✓ *Strong research skills in gathering and analyzing information related to IKS.*
- ✓ *Collaborative skills for preserving and promoting IKS.*
- ✓ *Enthusiasm for learning and practicing traditional skills such as weaving, pottery, and herbal medicine.*



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22SS103 INDIAN CULTURE AND HERITAGE

Hours Per Week :

L	T	P	SL	C
0	2	0	0	1

PREREQUISITE KNOWLEDGE: Basic understanding of Indian history and culture at the high school level.

COURSE DESCRIPTION AND OBJECTIVES:

This course introduces students to the foundational concepts, expressions, and institutions of Indian culture and heritage. Students will explore the richness of India's tangible and intangible legacies-its philosophies, arts, knowledge systems, and monuments-while engaging with key values like unity in diversity, sustainability, and respect for tradition. The course emphasizes civic responsibility, heritage preservation, and the contemporary relevance of India's cultural identity.

MODULE-1

UNIT-1 **0L + 12T + 0P + 0SL = 12 Hours**

CULTURE AND HERITAGE – MEANINGS AND DIMENSIONS:

Definitions: Culture and Heritage; Distinction between tangible and intangible heritage; Core features of Indian culture (Sanskriti): unity in diversity, continuity, and pluralism; Role of heritage in shaping identity and nation-building.

UNIT-2

HISTORICAL ROOTS OF HERITAGE:

Harappan Civilization and its heritage: city planning, trade, and script; ***Vedic culture*** and religious texts as cultural heritage; Cultural impact of Buddhism and Jainism; Bhakti and Sufi traditions as living intangible heritage; Local traditions and oral culture across regions.

PRACTICES:

- Comparative poster/chart on tangible vs intangible heritage.
- Case study presentation: a local or regional tradition.
- Group presentation on an ancient site recognized by UNESCO.
- Write a short essay: "Why preserve heritage in the digital age?"

MODULE-2

UNIT-1 **0L + 18T + 0P + 0SL = 18 Hours**

TANGIBLE HERITAGE – ART, ARCHITECTURE, AND MONUMENTS:

Architectural diversity: Temples, Mosques, Churches, Stupas, Forts, Palaces, and Rock-cut caves; Notable heritage sites: Hampi, Qutub Minar, Taj Mahal, Konark, Charminar, Lepakshi Temple, Amaravati Stupa, and Victoria Memorial; Conservation challenges: environmental threats, pollution, neglect, urbanization, and insensitive tourism; Role of ASI and UNESCO World Heritage recognition.

UNIT-2

INTANGIBLE HERITAGE – KNOWLEDGE, FESTIVALS, AND VALUES:

Indian classical music and dance as living heritage; Traditional systems: Ayurveda, Yoga, and traditional ecological knowledge; Community-based practices: folk traditions and seasonal festivals; Core cultural values: non-violence, nature worship, family systems, and community life.

UNIT-3

HERITAGE PRESERVATION IN MODERN INDIA:

Heritage sense during the freedom struggle (e.g., revival of Khadi, Swadeshi art); National institutions preserving heritage: IGNCA, INTACH, and ASI; Digital documentation and cultural mapping initiatives; Youth and civic responsibility in heritage conservation.

PRACTICES:

- Virtual tour/report on a heritage site.
- Storyboarding: heritage in daily life.
- Role-play or debate: "Heritage vs. Modernity – Finding the Balance."
- Case studies of successful community preservation efforts.

COURSE OUTCOMES:

Upon successful completion of the course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Mapping with POs
1	Apply key concepts of Indian culture and heritage to appreciate its role in shaping societal values and identity.	Apply	6, 11
2	Analyze the evolution and characteristics of India's tangible and intangible heritage across regions and time.	Analyze	5, 6, 8
3	Evaluate contemporary challenges and strategies in preserving heritage through institutional and civic efforts.	Evaluate	6, 7, 8
4	Evaluate how cultural values can inform ethical decision-making, sustainability practices, and inclusive societal participation.	Evaluate	6, 7, 8

MAPPING OF SUSTAINABLE DEVELOPMENT GOALS (SDGS) AND INDIAN KNOWLEDGE SYSTEM (IKS):

TEXTBOOKS:

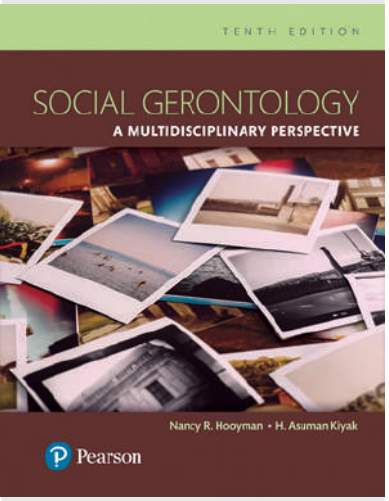
1. B. B. Satpathy, Indian Culture and Heritage, DDCE, Utkal University, 2015.
2. NIOS Course Material: Indian Culture and Heritage (223).
3. A.L. Basham, The Wonder That Was India, Vol.1, Rupa Publications, 1954.

REFERENCE BOOKS:

1. S. Radhakrishnan, Indian Philosophy: Volume I, 2nd ed., Oxford University Press India, 2008
2. Romila Thapar, The Penguin History of Early India: From the Origins to AD 1300, Penguin Books India, 2003.
3. John Keay, India: A History-Revised and Updated, Harper Collins, 2012.
4. Michel Danino, The Lost River; On the Trail of the Sarasvatī, Penguin Books India, 2010.

SKILLS:

- ✓ *Cultural awareness and ethical reasoning.*
- ✓ *Visual, analytical, and storytelling skills.*
- ✓ *Heritage appreciation and preservation thinking.*
- ✓ *Inclusive and civic-minded citizenship.*



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22SS105 GERONTOLOGY

Hours Per Week :

L	T	P	SL	C
0	2	0	0	1

PREREQUISITE KNOWLEDGE: Basic understanding of Indian society, family structure, and human development from middle school social studies.

COURSE DESCRIPTION AND OBJECTIVES:

This course provides an introduction to gerontology - the study of aging. This course helps students explore what it means to grow old in India, the role of the elderly in Indian families and society, and how we can care for and support older adults. It aims to help students understand the complexities of aging, challenge common stereotypes, and appreciate the diversity of the older adult population in India. Students will learn about real-life challenges faced by older people and ways to build a more inclusive, respectful society.

MODULE-1

UNIT-1 **0L+12T+0P+0SL = 12 Hours**

UNDERSTANDING AGING: BIOLOGICAL AND PSYCHOLOGICAL PERSPECTIVES:

Defining Gerontology: Introduction to the field, and its importance, with a note on the demographic shift in India; Theories of Aging: Biological theories (e.g., cellular clock theory, free radical theory) and psychological theories (e.g., Erikson's stages of psychosocial development, activity theory) and their applicability in the Indian context; Physiological Changes with Age: Common changes in body systems (e.g., cardiovascular, musculoskeletal, nervous) and common health challenges faced by older adults in India; Cognitive Changes with Age: Memory, attention, problem-solving, and the concept of cognitive reserve, with a focus on cognitive health in the Indian population; Mental Health in Later Life: Common challenges (e.g., depression, anxiety) and promoting well-being, considering cultural factors influencing mental health in older Indians.

UNIT-2

SOCIAL ASPECTS OF AGING AND DIVERSE EXPERIENCES IN INDIA:

Social Theories of Aging: Disengagement theory, continuity theory, socioemotional selectivity theory, and their relevance to Indian societal structures; Ageism and Stereotypes: Understanding prejudice and discrimination against older adults in India, challenging negative perceptions and cultural notions of aging; Family and Social Relationships: Role of the joint family system, nuclear families, friendships, and community networks in later life in India; Diversity in Aging in India: Exploring differences based on gender, rural/urban divide, socioeconomic status, religion, and regional variations in experiences of aging; Work, Retirement, and Leisure: Transitions in later life, challenges of formal and informal employment in old age, and the importance of meaningful engagement and traditional leisure activities.

PRACTICES:

- Create a "Grandparent Appreciation Poster" with stories or photos.
- Class discussion on respecting older people.
- Interview a grandparent or senior neighbour and share their experiences.

- Group discussions on common stereotypes about older adults in India and how to challenge them.

MODULE-2

UNIT-1 **0L+18T+0P+0SL=18 Hours**

HEALTH, WELLNESS, AND CARE IN LATER LIFE IN INDIA:

Promoting Healthy Aging: Lifestyle factors (nutrition, traditional diets, yoga, exercise), preventive care and traditional Indian health practices (e.g., Ayurveda); Common Health Conditions: Chronic diseases (e.g., arthritis, diabetes, heart disease) prevalent in India and their management, including access to healthcare; Healthcare Systems for Older Adults in India: Public and private healthcare, challenges of access and affordability, role of family caregivers, and emerging long-term care options; Palliative and End-of-Life Care: Understanding hospice, advance directives, and grief in the Indian cultural context; Technology and Aging: Assistive technologies, telehealth, and their role in supporting older adults in India, considering digital literacy and access.

UNIT-2

AGING IN INDIAN SOCIETY: POLICIES AND COMMUNITY SUPPORT:

Aging-in-Place and Age-Friendly Communities: Concepts and practical applications in Indian cities and villages; Social Policies and Programs for Older Adults in India: National Policy on Older Persons, Maintenance and Welfare of Parents and Senior Citizens Act, government schemes and initiatives; Intergenerational Relationships: Benefits of connecting different age groups, role of grandparents, and promoting intergenerational harmony in India; Ethical Considerations in Gerontology in India: Autonomy, informed consent, elder abuse prevention, and legal protections for older adults; Global Aging: Demographic trends and challenges worldwide, with a specific focus on India's rapidly aging population and its implications.

UNIT-3

INDIAN HERITAGE AND CULTURE IN AGING:

Culture and Civilization: Key characteristics of Indian culture and their influence on perceptions and experiences of aging; Visual Arts: Architecture, Sculpture, and UNESCO Heritage Sites as reflections of historical attitudes towards elders and their contributions; Performing Arts: Classical Music, Dance, and Literature as expressions of wisdom, tradition, and the life cycle in India; Traditional Wisdom and Aging: Exploring concepts like ***"vanaprastha"*** and the reverence for elders in Indian philosophy and texts; Role of Spirituality and Religion: Impact of spiritual and religious practices on well-being in later life in India.

PRACTICES:

- Research on age-friendly initiatives in Indian communities.
- Debate on the ethical considerations surrounding emerging technologies in aging, particularly for the Indian demographic.
- Analysis of how Indian cultural heritage reflects and influences the concept of aging.
- Visit to a local elder care centre or old age home.
- Make a "Healthy Aging Tips" chart.
- Skit or role play on how to care for elders at home or in public.

SKILLS:

- ✓ *Awareness of elderly rights and welfare mechanisms.*
- ✓ *Respect for cultural values and traditions towards elderly in India.*
- ✓ *Critical analysis of aging theories, stereotypes, demographic trends and policies with in Indian context.*
- ✓ *Understanding the diverse needs of older adults in India and societal responses.*
- ✓ *Interpretation of research data related to aging populations in India.*
- ✓ *Designing community-oriented aging interventions.*

COURSE OUTCOMES:

Upon successful completion of the course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Mapping with POs
1	Understand and apply core concepts and theories of gerontology.	Apply	6, 7, 8, 9
2	Analyze the social determinants of aging and the diverse experiences of older adults in India.	Analyze	6, 7, 8, 9
3	Evaluate the healthcare needs and policy frameworks relevant to older adults in India.	Evaluate	6, 7, 8, 9
4	Design and assess community-based solutions for elder care.	Create	6, 7, 8, 9

MAPPING OF SUSTAINABLE DEVELOPMENT GOALS (SDGS) AND INDIAN KNOWLEDGE SYSTEM (IKS):

TEXTBOOKS:

1. Hooyman, N. R., & Kiyak, H. A., Social Gerontology: A Multidisciplinary Perspective. Pearson, 2018.
2. Quadagno, J., Aging and the Life Course: An Introduction to Social Gerontology. McGraw-Hill Education, 2017.

REFERENCE BOOKS:

1. Irudaya Rajan, S., India's Elderly: Burden or Asset? Routledge, 2016.
2. Prakash, I. J., Aging in India: A Sociological Perspective. Rawat Publications, 2009.
3. Kumar, A., Elderly in India: A Socio-Economic Profile. Serials Publications, 2011.
4. Moody, H. R., & Sasser, B. R., Aging: Concepts and Controversies. Sage Publications, 2018.
5. Paltasingh, Tattwamasi, & Tyagi, Renu, Caring for the Elderly: Social Gerontology in the Indian Context. Sage Publications, 2015.
6. Victor, Christina R., The Social Context of Aging: A Textbook of Gerontology. Routledge, 2005.

22ME102 DO IT YOURSELF

Hours Per Week :

L	T	P	SL	C
0	0	2	0	1

PREREQUISITE KNOWLEDGE: Nil

COURSE DESCRIPTION AND OBJECTIVES:

This course is to empower the learners with hands-on experience in designing, fabricating, and testing small-scale engineering systems or components The course objective is to emphasize creativity, innovation, and real-world problem solving through “learning by doing.”

MODULE-1

0L+0T+12P+0SL = 12 Hours

FUNDAMENTALS OF CARPENTRY AND PLUMBING

UNIT-1

CARPENTRY:

Introduction to carpentry tools, use of tools for making simple objects like wooden shelf, picture frame, planters box, coat rack, floating shelves. Ś***ilpa*** Śā***stra (Woodwork & Craftsmanship)***

UNIT-2

PLUMBING:

Introduction to Plumbing tools, use of tools for making simple objects like fitting of taps, faucets, shower heads, replacement of washers in taps, simple pipe joints, few installations

PRACTICES:

- Design and construct a stable and functional 3-tier bookshelf made from plywood or reclaimed wood using dowel joints and varnished for finish using measuring tape, saw, chisel, drill, wood glue.
- Construct a portable and sturdy 3-legged stool made of teak or pine with dowel or mortise joints using Mallet, wood rasp, chisel, clamps.
- Fabricate a safe and user-friendly wooden organizer for books with crate-style bins fixed on a frame with rounded corners for safety using sandpaper, saw, wood router
- Craft a custom wall art panel or divider using CNC-routed or hand-carved geometric or nature-themed panels using CNC router or jigsaw, sander, varnish.
- Make a small desktop stand with precision-cut grooves for gadgets and accessories to hold mobile phones, pens, and sticky note using Coping saw, file, drill press.
- Replace a worn-out rubber washer inside a leaking compression tap using adjustable spanner, flat-head screwdriver, replacement washer, PTFE tape.
- Install a downpipe from the terrace with filtration and diversion to a recharge well using PVC downpipes, filter mesh, first-flush diverter, underground pipe, stones.
- Install a new wall-mounted faucet to replace a broken head, using standard plumbing fittings, pipe wrench, adjustable spanner, pipe sealant tape.
- Plan and install a PVC-based water line with two tap outlets and one washing machine point using T- and elbow joints using PVC cutter, solvent cement, marker, sandpaper.
- Install outlet piping from a 500L overhead water tank to supply a bathroom, kitchen, and garden tap using gravity flow using HDPE pipes, ball valves, elbows, thread tape, support brackets.

SKILLS:

- ✓ *Accurate measuring, marking, and cutting of wood.*
- ✓ *Identification and use of plumbing tools and fittings.*
- ✓ *Operating FDM 3D printers.*
- ✓ *Safe handling of electrical tools and live circuits.*
- ✓ *Disassembly and reassembly of small appliances.*

MODULE-2

0L+0T+18P+0SL = 18 hours

DIY JOBS RELATED TO ADVANCED APPLICATIONS

UNIT-1

3D PRINTING:

Introduction to the concept of FDM – 3D printing, printing of objects like spoon, mobile stand, pen holder, key chain

UNIT-2

HOME APPLIANCES:

Introduction to tools used in assembling/repairing home appliances, assembling of ceiling fan, change of capacitor of fan, checking of faulty winding in electrical appliances, Preventive Maintenance of a Split AC System

.UNIT-3

HOUSE WIRING:

Introduction to tools used in house wiring, fixing of tube light, fan, checking and repairing of a faulty fuse, fixing of a faulty switch/socket,

PRACTICES:

- List the steps you would follow to set up the printer, calibrate the build plate, and load the filament. What safety precautions should you take when handling the 3D printer?
- You need to print a simple personalized keychain with your initials using a 3D printer.
- You want to print a simple carabiner hook that will be used for carrying tools or equipment.
- You want to create a small, functional lock mechanism using 3D printing.
- You need to create a functional smartphone stand to hold your phone at an angle for watching videos or video calls.
- You have purchased a ceiling fan and wish to assemble and install it without professional help. List the sequence of steps you would follow to safely assemble and install the fan. What safety precautions must you take before beginning the installation?
- Your refrigerator seems to be cooling less effectively than usual. What simple checks and maintenance tasks can you perform yourself before calling a technician? Include cleaning, defrosting, and ventilation considerations.
- You have bought a new flat-screen TV and wall mount. What are the steps to assemble and mount it safely? What precautions must be taken regarding wire management and socket access?
- A tube light in your kitchen is flickering continuously and eventually stops working. After replacing the tube and starter, the issue persists. Describe the steps you would take to identify and fix the problem. What are the possible faulty components? How would you confirm if the ballast needs replacement?
- A room in your house loses power suddenly while other areas are unaffected. You suspect a blown fuse. How would you confirm this? Explain how to safely check and replace the fuse. What precautions should be taken to avoid future fuse failures?
- A wall switch that controls your living room light is no longer working — the light does not turn on even after changing the bulb. How would you go about checking the switch? What steps would you follow to replace it yourself, and how would you ensure it's safe to operate afterward?
- A socket in your bedroom is loose and occasionally sparks when plugging in devices. What are the risks involved, and how would you inspect and repair the socket? What are the signs that the socket needs replacement versus just re-tightening the connections?

COURSE OUTCOMES:

Upon successful completion of the course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Mapping with POs
1	Apply basic carpentry techniques to measure, cut, shape, and assemble wooden components using hand and power tools	Apply	1,5,6,7,10
2	Demonstrate the ability to install, maintain, and troubleshoot common residential plumbing systems	Apply	1,5,6,7,11
3	Design and fabricate functional 3D models using slicing software and additive manufacturing techniques	Create	1,5,10,11
4	Inspect, diagnose, and repair common faults in household appliances	Analyze	1,4,6
5	Construct safe and functional single-phase electrical wiring circuits for lighting, switching, and plug points	Evaluate	1,2,6,11

MAPPING OF SUSTAINABLE DEVELOPMENT GOALS (SDGS) AND INDIAN KNOWLEDGE SYSTEM (IKS):

TEXTBOOK:

1. “Basic Electrical Installation Work” by Trevor Linsley.

REFERENCE BOOKS:

1. “3D Printing and Additive Manufacturing: Principles and Applications” by Chee Kai Chua & Kah Fai Leong.
2. “Ultimate Guide: Plumbing” by Merle Henkenius
3. “Carpentry Complete” by Andy Engel.

VIGNAN'S

FOUNDATION FOR SCIENCE, TECHNOLOGY & RESEARCH

(Deemed to be University) - Estd. u/s 3 of UGC Act 1956

C22 Curriculum & Course Contents

B.Tech. (BiPC Stream)

w.e.f. batch 2022-29

ORIENTATION PROGRAM & PRE SEMESTER

B.Tech.

COURSE CONTENTS

ORIENTATION & PRE-SEMESTER

ORIENTATION PROGRAM

- 22SA101 - Orientation Program (Induction)

PRE SEMESTER

- 22MT102 - Engineering Mathematics Fundamentals (BiPC Streams)
- 22EN101 - English Language and Communication
- 22TP101 - Foundations of Quantitative Aptitude and Logical Reasoning
- 22AM101 - IT Tools
- 22SS104 - Stories of Indian Independence
- 22EN102 - Universal Human Values

22SA101 ORIENTATION PROGRAM

Hours Per Semester :

L	T	P	SL	C
0	30	0	0	1

Hours Per Week :

L	T	P	SL	C
0	2	0	0	1

PREREQUISITE KNOWLEDGE: Nil

COURSE DESCRIPTION AND OBJECTIVES:

This course is intended to help the students in getting adjusted with the new environment, to develop bondage with other students and faculty along with learning the institutional policies. The purpose of the orientation course is to create awareness on various issues that are essential for any individual. To familiarize the fresh entrants with the new environment and system in engineering education.To make the students a responsible citizens.To promote smooth transition from +2 level education to graduate program among students.

MODULE-1

0L+12T+0P+0SL = 12 Hours

UNIT-1

SOCIALIZING:

Interaction with faculty members, Deans, peers, student bodies and alumni.

UNIT-2

ASSOCIATING:

Eco-friendly practice and sustainable living, teaching sessions to school children of adopted villages, Interaction with farmers and identifying the problems, Field Visits.

PRACTICES:

- Stress assessment and management.
- Sustainable living.
- Iconic visit.

MODULE-2

0L+18T+0P+0SL = 18 Hours

UNIT-1

GOVERNING:

Brief about regulations and assessment pattern, Interaction with the functionaries i.e. Chancellor, Vice Chancellor and Registrar.

UNIT-2

EXPERIENCING:

Physical activity, Creative arts, Literary activities.

UNIT-3

MEDITATION:

Customizing Daily routines and Habits, Practicing Meditation.

SKILLS:

- ✓ *Understanding of organizational knowledge.*
- ✓ *Compliance Awareness.*
- ✓ *Team Integration.*
- ✓ *Adaptability and Confidence.*

PRACTICES:

- Yoga and meditation.
- Sports and Games.
- Any of the one creative art.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Mapping with POs
1	Become familiar with the institute ethics and culture.	Apply	7,8,9,10,12
2	Cope up with stress management through meditation.	Analyze	7,8,9,10,12
3	Socially conscious towards the society and environment.	Apply	7,8,9,10,12
4	Build bonds with peers and faculty members.	Apply	7,8,9,10,12

MAPPING OF SUSTAINABLE DEVELOPMENT GOALS (SDGs) :

22MT102 ENGINEERING MATHEMATICS FUNDAMENTALS

Hours Per Week :

L	T	P	SL	C
0	3	2	0	1

PREREQUISITE KNOWLEDGE: Basic algebra, trigonometry and elementary geometry.

COURSE DESCRIPTION AND OBJECTIVES:

This course provides fundamental mathematical concepts essential for engineering applications. It aims to enhance problem-solving skills and analytical thinking by covering algebraic expressions, coordinate geometry, trigonometry, permutations and combinations. The course focuses on practical applications in engineering scenarios.

MODULE-1

0L+06T+04P+0SL=10 Hours

UNIT-1

FUNDAMENTALS OF ALGEBRA:

Algebraic Expressions and Identities: Laws of exponents (basic usage), Simple factorization and simplification, Logarithm.

Linear and Quadratic Equations: Methods of solving (factorization, completing the square, quadratic formula).

UNIT-2

TRIGONOMETRY:

Definitions of trigonometric functions (right triangle approach) and fundamental identities, Functions in different quadrants, Domain and range.

PRACTICES:

- Perform basic algebraic simplifications and factorization.
- Solve linear and quadratic equations using different methods.
- Apply logarithmic properties to simplify expressions.
- Prove fundamental trigonometric identities.
- Plot and interpret trigonometric and algebraic functions.
- Apply trigonometry to model periodic events.
- Apply ***Bhāskara II's Bijaganita*** Techniques to Solve Quadratic Equations and Understand Geometric Roots.

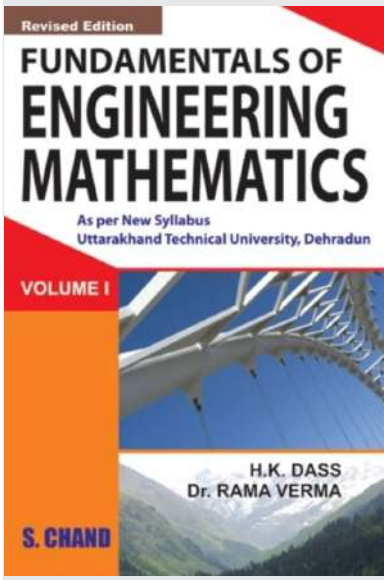
MODULE-2

0L+12T+08P+0SL=20 Hours

UNIT-1

PERMUTATIONS AND COMBINATIONS:

Basic counting techniques, Definition and properties of factorial n (n!), Simple permutations and combinations.



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SKILLS:

- ✓ *Mathematical problem-solving.*
- ✓ *Application of algebraic and geometric principles.*
- ✓ *Graphical representation and analysis.*
- ✓ *Logical reasoning and decision-making.*

UNIT-2

COORDINATE GEOMETRY:

Cartesian plane, Plotting points. Finding distance between two points, Division of a line segment, Concept of slope, Area and perimeter of some basic geometrical figures.

UNIT-3

STRAIGHT LINES AND APPLICATIONS:

Different forms of equations of a line (parallel to axes, slope-intercept and intercept forms), Conditions for parallel and perpendicular lines, Angle between two lines.

PRACTICES:

- Solve problems involving permutations and combinations.
- Calculate distances, midpoints and slopes in the Cartesian plane.
- Determine equations of lines under different conditions.
- Solve geometric problems involving straight lines.
- Apply learned concepts to engineering and practical scenarios.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to

CO No.	Course Outcomes	Blooms Level	Mapping with POs
1	Solve algebraic equations and expressions efficiently.	Apply	1, 2
2	Use coordinate geometry concepts to analyze geometric figures.	Apply	3, 5
3	Apply trigonometric identities to model real-world problems.	Apply	1, 2
4	Analyze permutations and combinations for decision-making problems.	Analyze	2, 10
5	Derive and apply equations of straight lines in different scenarios.	Analyze	3, 5

MAPPING OF SUSTAINABLE DEVELOPMENT GOALS (SDGs) AND INDIAN KNOWLEDGE SYSTEM (IKS) :

TEXT BOOKS:

1. B.S. Grewal, “Higher Engineering Mathematics”, Khanna Publishers, 44th Edition, 2017.
2. Erwin Kreyszig, “Advanced Engineering Mathematics”, John Wiley & Sons, 10th Edition, 2011.

REFERENCE BOOKS:

1. R.K. Jain, S.R.K. Iyengar, “Advanced Engineering Mathematics”, Narosa Publishing, 5th Edition, 2016.
2. H.K. Dass, “Advanced Engineering Mathematics”, S. Chand Publishing, 28th Edition, 2018.
3. M.D. Greenberg, “Advanced Engineering Mathematics”, Pearson Education, 2nd Edition, 1998.

22EN101 ENGLISH LANGUAGE AND COMMUNICATION

Hours Per Week :

L	T	P	SL	C
0	3	2	0	1

PREREQUISITE KNOWLEDGE: Basic proficiency in English (A1-A2 level), with the ability to understand and participate in simple conversations and write short texts.

COURSE DESCRIPTION AND OBJECTIVES:

This course is designed to strengthen intermediate language skills, focusing on improved fluency, vocabulary expansion, grammatical accuracy, and effective communication in academic, social, and professional settings. The course prepares learners for B1 level proficiency, enabling them to handle a wider range of communication tasks.

MODULE-1

0L + 6T + 4P + 0SL = 10 Hours

UNIT-1

ENHANCING EVERYDAY COMMUNICATION:

- **Reading:** Interpreting short articles, messages, and dialogues with implied meanings.
- **Writing:** Completing guided writing tasks such as formal requests and informal responses.
- **Listening:** Understanding longer conversations and identifying tone and purpose.
- **Speaking:** Describing routines, experiences, and making comparisons using various tenses.

UNIT-2

SOCIAL INTERACTIONS AND OPINIONS:

- **Reading:** Understanding text structures and making inferences.
- **Writing:** Correcting and rewriting passages with grammatical errors.
- **Listening:** Extracting specific and general information from monologues.
- **Speaking:** Expressing personal opinions with justifications in short discussions.

PRACTICES MAPPED WITH IKS:

- Reading emails, blogs, and notices with detailed comprehension: ***Script styles from palm leaf manuscripts.***
- Listening to authentic audio clips and identifying perspectives: ***Oral transmission techniques.***
- Engaging in pair and group discussions on daily topics: ***Community storytelling/council culture.***
- Writing short reports and summaries: ***Panchayat records and administrative logs.***

MODULE-2

0L+12T+08P+0SL=20 Hours

UNIT-1

EXPRESSING THOUGHTS AND OPINIONS:

- **Reading:** Analyzing articles and opinion pieces.
- **Writing:** Writing coherent paragraphs expressing opinions.
- **Listening:** Listening to debates and identifying arguments.
- Speaking: Participating in structured group discussions on likes/dislikes and choices.

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SKILLS:

- ✓ *Receptive Skills – Reading and Listening.*
- ✓ *Productive Skills – Writing and Speaking.*
- ✓ *Public Speaking –Presentation.*

UNIT-2

GOALS, ASPIRATIONS, AND PERSONAL DEVELOPMENT:

- **Reading:** Understanding and summarizing goal-setting articles.
- **Writing:** Writing short essays on career plans.
- **Listening:** Comprehending longer audio clips related to personal stories and achievements.
- **Speaking:** Delivering short talks on aspirations and future plans.

UNIT-3

RELATIONSHIPS AND IDENTITY:

- **Reading:** Understanding and analyzing email correspondence.
- **Writing:** Writing formal and informal emails and messages.
- **Listening:** Listening for relationship dynamics and speaker attitude.
- **Speaking:** Giving presentations on personal relationships and milestones.

PRACTICES MAPPED WITH IKS:

- Reading narratives and informative texts: ***Panchatantra, Jataka tales.***
- Listening to podcasts and interviews: ***Oral tradition in storytelling, folk wisdom.***
- Writing structured essays and reflections: ***Spiritual reflection in Indian philosophy.***
- Role-playing interviews and discussions: ***Courtroom and sabha simulations.***

COURSE OUTCOMES:

Upon successful completion of this course, students will be able to:

CO No.	Course Outcomes	Blooms Level	Mapping with POs
1	Interpret intermediate-level texts, including articles, blogs, and personal communications.	Apply	6,7,8,9,11
2	Write structured content such as essays, formal emails, and descriptive paragraphs.	Apply	6,7,8,9,11
3	Analyze speaker's intent, tone, and point of view in spoken texts.	Analyze	6,7,8,9,11
4	Evaluate and present arguments with clarity and coherence.	Evaluate	6,7,8,9,11

MAPPING OF SUSTAINABLE DEVELOPMENT GOALS (SDGs) AND INDIAN KNOWLEDGE SYSTEM (IKS) :

TEXT BOOKS:

1. B1 Preliminary for Schools – Student's Book by Cambridge University Press, 2020.

   Aligned with B1-B2 level learners, this textbook provides comprehensive practice in all four skills using real-world contexts.

REFERENCE BOOKS:

1. B1 Preliminary for Schools Trainer (Six Practice Tests) – Cambridge University Press, 2020.

   Includes exam-style tasks, strategies, and explanations to build confidence and fluency.

2. English Grammar in Use (Intermediate) by Raymond Murphy – Cambridge University Press.

   Self-study grammar book with clear explanations and practice exercises, suitable for B1–B2 learners.

3. Write & Improve – Cambridge Write & Improve online tool.

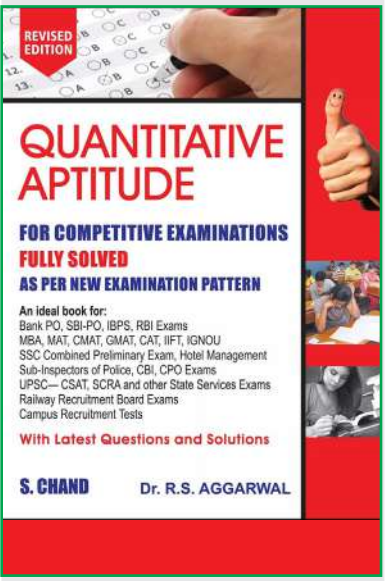
   An interactive writing platform providing real-time feedback to enhance writing skills.

4. BBC Learning English – Intermediate Section – BBC Learning English.

   Free listening, vocabulary, and grammar materials tailored for intermediate learners.

5. Cambridge English Online Dictionary and Thesaurus – https://dictionary.cambridge.org

   Useful for building vocabulary and understanding word usage with examples.



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22TP101 FOUNDATIONS OF QUANTITATIVE APTITUDE AND LOGICAL REASONING

Hours Per Week :

L	T	P	SL	C
0	5	0	0	1

PREREQUISITE KNOWLEDGE: Basic Mathematics Proficiency.

COURSE DESCRIPTION AND OBJECTIVES:

The "Foundation to Intermediate Quantitative Aptitude & Logical Reasoning" course is designed to develop both foundational and advanced skills in arithmetic, data interpretation, puzzles, and logical reasoning. By incorporating hands-on problem-solving exercises, strategic thinking, and time management techniques, the course enhances critical thinking and systematic problem-solving abilities. It equips students with the tools to tackle complex challenges efficiently, improve speed and accuracy, and prepare effectively for competitive exams, placements, and professional tasks.

MODULE-1

0L+10T+0P+0SL=10 Hours

UNIT-1

QUANTITATIVE APTITUDE 1:

Understanding Numbers and Their Types, Finding Common Multiples and Divisors, Percentages and Their Applications of Ratios and Proportions.

UNIT-2

QUANTITATIVE APTITUDE 2:

Calculating Profit, Loss, and Discount, Finding Averages and Solving Mixture Problems, Calculating Simple and Compound Interest, Time and Work Problems.

PRACTICES:

- Each concept would be taught in detail in the class.
- Followed by 10 problems solved in the class.
- Timer based questions solving during class room practice.
- Students would have to solve 10 additional problems as homework assignment in each concept.

MODULE-2

0L+20T+0P+0SL=20 Hours

UNIT-1

QUANTITATIVE APTITUDE 3:

Problems on Time and Distance, Average Speed, Relative Speed and its application on Trains Ages related with Ratios, Introduction to Permutations and Combinations, Probability Problems.

UNIT-2

LOGICAL REASONING 1:

Finding Patterns in Number Series, Identifying Patterns in Letter Sequences, Letter and Number Analogies, Identifying the Odd One Out with multiple categories, Decoding different coded patterns, Syllogism Problems with Venn diagrams.

UNIT-3

LOGICAL REASONING 2:

Puzzles involving Seating related problems, Blood Relations with Family Trees, Solving Problems on Directions, Order and Ranking Problems with multiple criteria, Solving Seating Arrangement Problems, Problems involving Days, Dates in Calendars and Finding different angles in Clocks.

PRACTICES:

- Each concept would be taught in detail in the class.
- Followed by 10 problems solved in the class.
- Timer based questions solving during class room practice.
- Students would have to solve 10 additional problems as homework assignment in each concept.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Mapping with POs
1	Develop foundational skills in arithmetic, algebra, and equations for effective problem-solving.	Apply	1, 5
2	Enhance data interpretation accuracy for graphs and charts.	Analyze	1, 4, 5
3	Build confidence and expertise for aptitude tests and professional exams.	Evaluate	2, 5
4	Master time-efficient problem-solving techniques and systematic approaches to tackle complex challenges.	Create	1, 3, 5
5	Strengthen logical reasoning to solve puzzles, sequences, and arrangements efficiently.	Analyze	2, 6, 11

MAPPING OF SUSTAINABLE DEVELOPMENT GOALS (SDGs):

TEXT BOOKS:

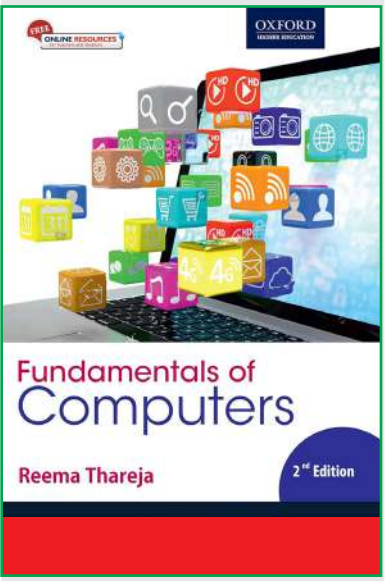
1. 1. R. S. Aggarwal - Quantitative Aptitude for Competitive Examinations - S.Chand Publications - Edition-2023.
2. R. S. Aggarwal - A Modern Approach to Logical Reasoning - S.Chand Publications - Edition-2022.

REFERENCE BOOKS:

1. Trishna Knowledge Systems- Quantitative Aptitude for Competitive Examinations - Pearson Publication - First Edition-2013.
2. R. S. Aggarwal - A Modern Approach to Verbal &Non-Verbal Reasoning - S.Chand Publication - Revised Edition-2018.
3. B.S. Sijwali & S. Sijwali - A New Approach to Reasoning - Arihant Publication - Edition-2018.

SKILLS:

- ✓ *Develop the ability to analyze problems logically and derive effective solutions.*
- ✓ *Master calculations and numerical reasoning for tackling arithmetic and algebraic challenges.*
- ✓ *Gain proficiency in interpreting and analyzing data through charts, graphs, and tables.*
- ✓ *Enhance skills in pattern recognition, critical thinking, and solving puzzles.*
- ✓ *Learn strategies to solve problems quickly and efficiently within time constraints.*



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22AM101 IT TOOLS

Hours Per Week :

L	T	P	SL	C
0	0	5	0	1

PREREQUISITE KNOWLEDGE: Nil

COURSE DESCRIPTION AND OBJECTIVES:

- Equip students with practical knowledge and skills in using essential IT tools such as:
  - Microsoft Word, Excel, and PowerPoint.
  - LaTeX for professional document preparation.
- Enable students to apply these tools in academic, personal, and professional.

MODULE-1

0L+0T+10P+0SL=10 Hours

UNIT-1

WORD:

- Create a table of student marks with subjects, apply shading, change border styles, and align text.
- Create a form letter for a notice and use Mail Merge to send it to a list of student names and roll numbers.
- Design a basic resume with sections for personal info, education, skills, and interests. Use bullet points, alignment, and simple borders.
- Create a 2-column newsletter layout with headers, images, text boxes, and WordArt.
- Create a content index at the top of the page. Add hyperlinks or bookmarks to navigate to each section.
- Create a brochure for a 2-day academic conference with schedule, keynote speakers, and contact info using creative layout and styles.

UNIT-2

EXCEL:

- Format a student mark sheet with at least 5 subjects and calculate total and average.
- Create a payroll system in Excel for 5 employees given Basic salary, 40% for D.A;12% for HRA; 10% for TA; 10% for CCA; 12% for PF; IT 10%. Calculate the gross and net salary.
- Use SUM, AVERAGE, MIN, MAX functions on sales data for five products across 6 months.
- Use an IF function to assign "Pass" or "Fail" based on marks (>35).
- Create a bar chart comparing quarterly sales across different regions.

MODULE-2

0L+0T+18P+0SL=18 Hours

UNIT - 1

ADVANCED EXCEL:

- Highlight all cells in a sales column that are above ₹50,000 using conditional formatting.
- Sort employee records by department and filter to show only those with experience > 5 years.
- Use a Pivot Table to summarize sales by product and region.
- Create an employee lookup sheet where entering an Employee ID returns name, department, and salary.
- Build a monthly attendance sheet for a class, calculate attendance percentage, and highlight students below 75%.
- Develop an EMI calculator that takes principal, interest rate, and tenure to calculate monthly payments.

UNIT-2

POWERPOINT:

- Create a 5-slide presentation introducing yourself—name, interests, hobbies, and goals. Apply different slide layouts and basic transitions.
- Create a 3-slide presentation on your favourite place. Include images, shapes, and text boxes, and use picture styles.
- Create a presentation showing sales data. Insert a table and a chart (bar/pie) to visualize the data.
- Use Slide Master to create a consistent design for all slides (e.g., university (VFSTR) logo in header/footer and common font styling).
- Create a presentation containing an embedded video or audio clip, and set it to play automatically.

UNIT-3

LATEX:

- Create a LaTeX document with a title, author, and date. Include two paragraphs and a section heading.
- Demonstrate text formatting by creating a paragraph using bold, italic, underline, and monospace fonts.
- Create a bulleted list of at least 3 hobbies and a numbered list of your top 3 goals.
- Write the quadratic formula and a few basic math expressions such as fractions, exponents, and square roots.
- Insert an image of your choice (e.g., example-image.jpg) into a document and add a caption below it.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Mapping with POs
1	Create word documents, presentations and spread sheets by applying various tools	Apply	2,5
2	Usage of latex tool for report writing	Apply	5,6

MAPPING OF SUSTAINABLE DEVELOPMENT GOALS (SDGs) :

TEXT BOOKS:

1. Fundamentals of Computers by Reema Thareja, Oxford University Press 2nd edition 2019, India.
2. Lamport, Leslie (1994). LaTeX: A Document Preparation System, User's Guide and Reference Manual (2nd ed.). Pearson Education.
3. LaTeX: A Document Preparation System by Leslie Lamport.

REFERENCE BOOKS:

1. John Walkenbach, Herb Tyson, Michael R.Groh and FaitheWempen, "Microsoft Office 2010 Bible", Wiley.

SKILLS:

- ✓ *Formatting, document design, resume & letter writing, mail merge.*
- ✓ *Data entry, formulas, payroll systems, pivot tables.*
- ✓ *Slide creation, use of multimedia and animations.*
- ✓ *Posters, brochures, magazine cover creation.*
- ✓ *Basic webpage creation using hyperlinks and styles.*
- ✓ *Using Excel for- mulas and data analysis.*
- ✓ *Document design and presentation delivery.*
- ✓ *LaTeX for academic and professional documents.*

22SS104 STORIES OF INDIAN INDEPENDENCE

Hours Per Week :

L	T	P	SL	C
0	2	0	0	1

PREREQUISITE KNOWLEDGE: Basic understanding of Indian history at the high school level.

COURSE DESCRIPTION AND OBJECTIVES:

This course introduces students to the inspiring narratives of India's struggle for independence. It focuses not only on well-known leaders but also on forgotten heroes, movements, and lesser-known revolts that collectively shaped India's freedom story. The course aims to instill national pride, civic consciousness, and leadership qualities in students while strengthening their appreciation for democratic values and social responsibility.

MODULE-1

0L+12T+04P+0SL=12 Hours

UNIT-1

EARLY RESISTANCES AND UNSUNG HEROES:

Revolts Before 1857: Vellore Mutiny, Paika Rebellion, and Sanyasi-Fakir Rebellion; Revolt of 1857: Causes, Course, and Consequences; Tribal and Peasant Uprisings: Santhal Rebellion and Munda Ulgulan; Lesser-Known Freedom Fighters: Rani Gaidinliu; Veerapandiya Kattabomman, and Birsa Munda.

UNIT - 2

PATHBREAKING MOVEMENTS AND LEADERS:

Formation of Indian National Congress and Early Nationalism; Swadeshi and Boycott Movements (1905); Role of Revolutionary Activities: Anushilan Samiti and Hindustan Socialist Republican Association; Transnational and Pan-Indian Movements: Ghadar Movement and Khilafat Movement (Ali Brothers).

PRACTICES:

- Research and present a profile of a lesser-known freedom fighter featured in the unit.
- Prepare a comparative chart on the Revolt of 1857 and the Ghadar Movement.
- Participate in a debate or panel discussion on the role of religion and revolution in India’s freedom struggle.
- Create a digital timeline covering key events from early revolts to transnational movements (1800–1920).

MODULE-2

0L+18T+0P+0SL=18 Hours

UNIT-1

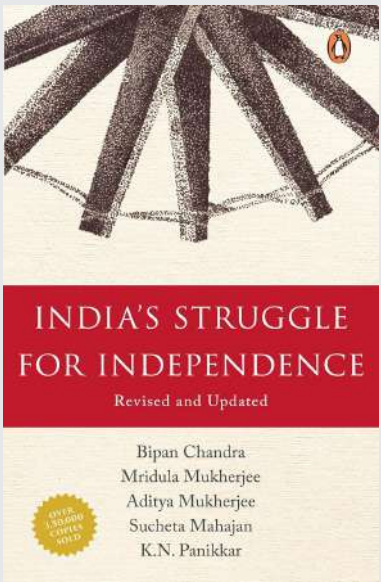
MASS MOVEMENTS AND PEOPLE’S PARTICIPATION:

Non-Cooperation Movement (1920–22); Civil Disobedience Movement and Salt Satyagraha; Quit India Movement (1942): "Do or Die" Spirit; Role of Women and Students in the Freedom Struggle.

UNIT - 2

VISIONARIES AND THEIR LEGACIES:

Mahatma Gandhi: Philosophy of Satyagraha and Ahimsa; Subhas Chandra Bose and INA; Bhagat Singh and Revolutionary Nationalism; Dr. B.R. Ambedkar and the Struggle for Social Justice.



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SKILLS:

- ✓ *Leadership and teamwork by understanding collective struggles.*
- ✓ *Analytical skills through study of strategies and methods used in the freedom struggle.*
- ✓ *Communication skills via storytelling, debates, and presentations.*
- ✓ *Ethical thinking by appreciating sacrifice, social responsibility, and patriotism.*

UNIT - 3

TRANSITION TO INDEPENDENCE:

The Cabinet Mission Plan and Negotiations; Partition and Independence: Causes and Consequences; Integration of Princely States: Sardar Patel's Role; Building a New Nation: Early Challenges.

PRACTICES:

- Group discussions on major movements.
- Role-play / dramatizations: Dandi March, INA Trials, Quit India Movement.
- Documentary review assignments: Freedom struggle films and documentaries.
- Quiz competitions on key events and leaders.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to

CO No.	Course Outcomes	Blooms Level	Mapping with POs
1	Apply knowledge of early revolts and lesser-known freedom fighters to understand regional contributions to India's independence.	Apply	6, 11
2	Analyze the development of nationalist ideologies and the role of revolutionary, religious, and transnational movements.	Analyze	6, 8, 9
3	Evaluate the contributions of women, students, and marginalized communities in shaping the mass movements of the freedom struggle.	Evaluate	6, 7, 11
4	Apply lessons of patriotism, leadership, and social responsibility to contemporary societal roles and ethical decision-making.	Apply	6, 7, 11

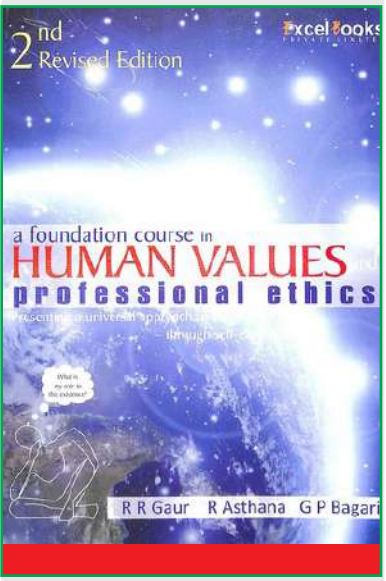
MAPPING OF SUSTAINABLE DEVELOPMENT GOALS (SDGs) AND INDIAN KNOWLEDGE SYSTEM (IKS) :

TEXT BOOKS:

1. Bipin Chandra, India's Struggle for Independence, Penguin, 2016.
2. Sekhar Bandyopadhyay, From Plassey to Partition and After: A History of Modern India, Orient Blackswan, 2014 (Reprint Edition).

REFERENCE BOOKS:

1. Ramachandra Guha, Gandhi: The Years That Changed the World, Penguin, 2018.
2. Sugata Bose, His Majesty's Opponent: Subhas Chandra Bose and India's Struggle against Empire, Harvard University Press, 2011.
3. S. Gopal, Jawaharlal Nehru: A Biography, Harvard University Press.



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22EN102 UNIVERSAL HUMAN VALUES

Hours Per Week :

L	T	P	SL	C
0	2	0	0	1

PREREQUISITE KNOWLEDGE: Nil

PREREQUISITE KNOWLEDGE:

UHV (Universal Human Values) doesn't necessarily require specific prerequisite knowledge. It's designed to be accessible for students with various backgrounds. However, there are some foundational concepts like 'Basic understanding of ethics, Openness to different perspectives, Ability for critical thinking' might be helpful.

COURSE DESCRIPTION AND OBJECTIVE:

This course helps the students to appreciate the essential complementarily between 'Values' and 'Skills' to ensure sustained happiness and prosperity which are the core aspirations of all human beings It also helps to develop students' holistic perspective based on self-exploration about themselves (human being) and their family. It further touches issues very briefly related to their role in the society and the nature.

MODULE-1

0L+16T+0P+2SL=16 Hours

UNIT-1

INTRODUCTION TO VALUE EDUCATION:

Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education) Understanding Value Education, ***(concept of Dharmasastra)*** self-exploration as the Process for Value Education, Continuous Happiness and Prosperity – the Basic Human aspirations. Happiness and Prosperity – Current Scenario.

UNIT-2

HARMONY IN THE HUMAN BEING:

Understanding Human being as the Co-existence of the Self and the Body -Distinguishing between the Needs of the Self and the Body- The Body as an Instrument of the Self- Understanding Harmony in the Self- Harmony of the Self with the Body ***(Concept of Sanyam)*** - Programme to ensure self-regulation and Health.

PRACTICES:

- Sharing about Oneself.
- Talk on Everyday life situation.
- Reflect on what she/he would do in this situation.
- Exploring Natural Acceptance.

MODULE-2

0L+18T+0P+0SL=18 Hours

UNIT-1

HARMONY IN THE FAMILY AND SOCIETY:

Harmony in the Family – the Basic Unit of Human Interaction-'Trust' – the Foundational Value in Relationship, 'Respect and Excellence' – as the Right Evaluation, Other Feelings, Justice in Human-to- Human Relationship, Understanding Harmony in the Society ***(Concept of Nyaya)***.

UNIT-2

HARMONY IN THE NATURE/EXISTENCE:

Harmony in the Nature- Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature- Realizing Existence as Co-existence at All Levels- The Holistic Perception of Harmony in Existence ***(Concept of Pancha Mahabhuta).***

UNIT-3

IMPLICATIONS OF THE HOLISTIC UNDERSTANDING – A LOOK AT PROFESSIONAL ETHICS:

Natural Acceptance of Human Values- Definitiveness of (Ethical) Human Conduct- Competence in Professional Ethics-: Holistic Technologies, Production Systems and Management Models- Typical Case Studies- Strategies for Transition towards Value-based Life and Profession (Concept of Universal Human Values).

PRACTICES:

- Consider the potential consequences of each option (returning vs. keeping).
- Case studies: Analyze real-world examples.
- Group discussions: Sharing perspectives and learn from others' experiences.
- Role-play scenarios to navigate conflict resolution and promote healthy interaction.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Mapping with POs
1	Apply the essentials of human values and skills, self-exploration, happiness and prosperity.	Apply	7,8,9,10
2	Apply to self-regarding the coexistence of the "I" with the body.	Apply	7,8,9,10
3	Identify and evaluate the role of harmony in family, society and universal order.	Evaluate	7,8,9,10
4	Analyze the holistic perception of harmony at all levels of existence.	Analyze	7,8,9,10
5	Develop appropriate technologies and management patterns to create harmony in professional and personal life.	Create	7,8,9,10

MAPPING OF SUSTAINABLE DEVELOPMENT GOALS (SDGs) AND INDIAN KNOWLEDGE SYSTEM (IKS) :

TEXT BOOK:

1. R R Gaur, R Sangal, G P Bagaria, "Human Values and Professional Ethics", Excel Books, New Delhi, 2010.

REFERENCE BOOKS:

1. A.N. Tripathi, "Human Values", New Age Intl. Publishers, New Delhi, 2004.
2. Gergen, K. J. "Relational Being: Beyond Self and Community", United Kingdom: Oxford University, Press, 2009.
3. A Nagraj, "Jeevan Vidya ek Parichay", Divya Path Sansthan, Amarkantak", 1998.
4. E.F. Schumacher, "Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain" 1973.
5. R R Gaur, R Sangal, G P Bagaria, "A Foundation Course in Human Values and Professional Ethics", 2009.

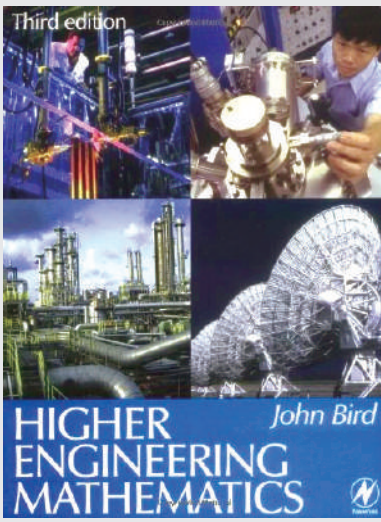
I YEAR

B.Tech.

COURSE CONTENTS
(BiPC STREAM)

22MT104	-	Elementary Mathematics
22MT106	-	Matrices and Ordinary Differential Equations
22PY102	-	Applied Physics
22CT103	-	Organic Chemistry
22EE102	-	Fundamentals of Electrical and Electronics Engineering
22ME101	-	Engineering Drawing
22CS101	-	Programming in C
22EN103	-	English Proficiency and Communication Skills
22CT101	-	Environmental Studies
22MS101	-	Management Studies
22CS102	-	Problem Solving through Python
22EN104	-	Technical English Communication
22CY101	-	Cyber Security
22SS101	-	Constitution of India
22SA103	-	Physical fitness
22SA104	-	Life Skills
22SA102	-	Self-understanding and Gender Sensitization
22SS102	-	Indian Knowledge Systems
22SS103	-	Indian Culture and Heritage
22SS105	-	Gerontology
22ME102	-	Do it yourself

22MT104 ELEMENTARY MATHEMATICS



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Hours Per Week :

L	T	P	SL	C
3	2	0	3	4

PREREQUISITE KNOWLEDGE: Basics of Geometry and Algebra.

COURSE DESCRIPTION AND OBJECTIVES:

This course introduces fundamental concepts in set theory, mathematical progressions, trigonometry, calculus (limits, derivatives and integrals) and their applications. It aims to strengthen students' analytical and problem-solving skills, serving as a foundation for advanced engineering mathematics

MODULE-1

UNIT-1 **18L+12T+0P+18SL = 48 Hours**

SET THEORY:

Definition and representation of sets, Cardinality of a set, Finite and infinite sets, Operations on sets, Venn diagram.

Relations, Types of relations, Functions, Types of functions, Even and odd functions.

UNIT-2

MATHEMATICAL PROGRESSIONS AND TRIGONOMETRY:

Arithmetic progression, Geometric progression, Harmonic progression and their means.

Trigonometric ratios, Compound angles, Multiple and sub-multiple angles.

PRACTICES:

- Solve set operations and find the cardinality of given sets.
- Verify reflexivity, symmetry and transitivity of relations.
- Determine even and odd functions graphically and analytically.
- Finding the general term and sum of infinite terms of progression.
- Solve trigonometric identities and compute angles in different quadrants.
- Evaluation of Trigonometric function.
- Use ***Panini's Ashtadhyayi*** Structure to Understand Functions and Rule-Based Mathematical Transformations.

MODULE-2

UNIT-1 **27L+18T+0P+27SL = 72 Hours**

LIMITS AND CONTINUITY:

Limit of a function, Properties, One sided limit.

Continuity, Properties, Intermediate value theorem and its application in root findings.

UNIT-2

DIFFERENTIATIONS:

Introduction, Derivatives of elementary functions, Sum rule, Product rule, Quotient rule, Higher Order Derivatives.

Applications: Velocity and Acceleration, Increasing and Decreasing Functions, Maxima and Minima.

SKILLS:

- ✓ *Apply the dynamics of Light to realize the various potential applications in Engineering.*
- ✓ *Evaluate the concepts of Lasers and Optical Fibers to realize versatile applications in Science, Engineering and Technology.*
- ✓ *Analyze the Crystal Structures and orientation of planes.*
- ✓ *Appraise the importance of Ultrasonics in medicine.*
- ✓ *Demonstrate the synthesis and characterization of Nano materials in view of their applications.*

UNIT-3

INTEGRATIONS:

Integrations of elementary functions, Methods of integration: substitution, by parts and partial fractions, Definite integration.

Applications: Area under a Curve, Area between two Curves.

PRACTICES:

- Solve problems involving derivatives using the sum, product and quotient rules.
- Calculate points of maxima or minima for given curves.
- Evaluate integrals using substitution, partial fractions and by-parts methods.
- Find areas under curves and between intersecting curves.

COURSE OUTCOMES:

Upon successful completion of this course, students will be able to:

CO No.	Course Outcomes	Bloom's Level	Mapping with POs
1	Understand and apply fundamental concepts of set theory and functions.	Apply	1, 2
2	Analyze mathematical sequences and apply trigonometric identities.	Analyze, Apply	1, 2
3	Evaluate limits and test continuity of functions using standard techniques.	Evaluate	1
4	Compute derivatives and apply them to real-world problems involving rates.	Apply, Analyze	1, 2, 4
5	Perform integration using various methods and apply them to area problems.	Apply, Evaluate	1, 2

MAPPING OF SUSTAINABLE DEVELOPMENT GOALS (SDGS) AND INDIAN KNOWLEDGE SYSTEM (IKS):

TEXT BOOKS:

1. John Bird, "Higher Engineering Mathematics", 5th Edition, Routledge (Taylor and Francis Group), New York, 2018.
2. Kanti B. Datta, Varma, P. Sekhar, "Calculus, Linear Algebra and Ordinary Differential Equations", Cengage Learning, 1st Edition, 2024

REFERENCE BOOKS:

1. B.S. Grewal, "Higher Engineering Mathematics", 44th Edition, Khanna Publishers, New Delhi, 2017.
2. Veerarajan, T., "Engineering Mathematics", 1st Edition, Tata McGraw Hill Publishing Co., New Delhi, 2019.
3. Venkataraman M. K., "Engineering Mathematics – First Year", 2nd Edition, National Publishing Co., Chennai, 2000.

22MT106 MATRICES AND ORDINARY DIFFERENTIAL EQUATIONS

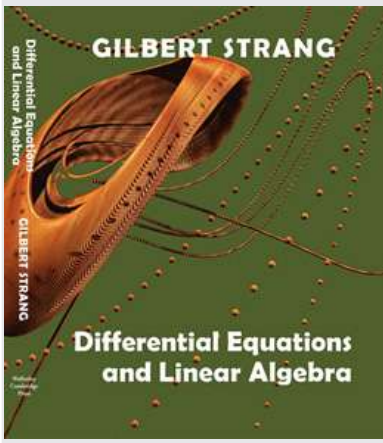
Hours Per Week :

L	T	P	SL	C
3	2	0	3	4

PREREQUISITE KNOWLEDGE: Basics of Algebra and Calculus.

COURSE DESCRIPTION AND OBJECTIVES:

This course aims to equip students with foundational concepts of matrices and ordinary differential equations (ODEs). Students will learn matrix operations, eigenvalues and eigenvectors, as well as solving and applying first-order and second-order ODEs to real-world problems.



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MODULE-1

UNIT-1 **18L+12T+0P+18SL = 48 Hours**

MATRICES AND DETERMINANTS:

Introduction to matrices, Types of matrices, Algebra of matrices, Determinant and its properties, Adjoint of a matrix, Inverse of a matrix through adjoint.

Elementary row and column operations, Echelon form, Row reduced echelon form, Rank of a matrix, Inverse of a matrix by Gauss-Jordan method.

UNIT-2

SYSTEMS OF LINEAR EQUATIONS:

Homogeneous and non-homogeneous systems of linear equations, matrix representation of linear systems, Consistency using rank of the coefficient matrix, Solution of systems of linear equations: Gauss elimination method, Gauss-Jordan method.

PRACTICES:

- Find inverse of a matrix using adjoint and elementary operations.
- Find rank of a matrix.
- Check consistency of a system of linear equations.
- Solve linear systems using Gauss elimination and Gauss-Jordan methods.
- Solve systems of linear equations using the ***Pāñcarātra Nyāya*** (Five-step logical method) and compare with Gauss Elimination. Reflect on structured reasoning in Indian Knowledge Systems.

MODULE-2

UNIT-1 **27L+18T+0P+27SL = 72 hours**

EIGENVALUES AND EIGENVECTORS:

Eigenvalues and eigenvectors (up to 3×3 matrices only), Properties, Cayley-Hamilton theorem (without proof) and verification, Inverse of a matrix by CHT.

UNIT-2

FIRST ORDER ORDINARY DIFFERENTIAL EQUATIONS:

Introduction, Order and degree, Formation of ODE from a given one-parameter family of curves, Solutions: Variable separable method, homogeneous, equation reducible to variable separable type, linear and Bernoulli's equations.

SKILLS:

- ✓ *Problem-solving with linear algebra techniques.*
- ✓ *Analytical thinking in modeling physical systems with ODEs.*
- ✓ *Application of mathematical concepts to real-world engineering scenarios.*

Applications: Newton's law of cooling, Natural growth and decay.

UNIT-3

SECOND ORDER ORDINARY DIFFERENTIAL EQUATIONS:

Homogeneous and non-homogeneous equations, Complementary functions, Particular integrals, Solution with constant coefficients: method of undetermined coefficients, variation of parameters.

PRACTICES:

- Compute eigenvalues and eigenvectors for given matrices.
- Verify Cayley-Hamilton theorem for small matrices.
- Find inverse using Cayley-Hamilton theorem.
- Find general and particular solutions of first and second-order ODEs.
- Apply differential equations to model and solve real-life problems.

COURSE OUTCOMES:

Upon successful completion of the course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Mapping with POs
1	Apply matrix operations, including determinant, inverse and rank, to solve engineering problems.	Apply	1, 2, 5
2	Compute eigenvalues and eigenvectors and apply the Cayley-Hamilton theorem in matrix applications.	Analyze	1, 2, 5
3	Solve first-order ODEs using analytical methods and apply them to engineering problems.	Apply	1, 3, 4, 5
4	Solve second-order ODEs and evaluate their applications in physical and engineering systems.	Evaluate	1, 3, 4, 6
5	Use mathematical techniques to model real-world scenarios using matrices and ODEs.	Create	1, 2, 4, 6, 10, 11

MAPPING OF SUSTAINABLE DEVELOPMENT GOALS (SDGS) AND INDIAN KNOWLEDGE SYSTEM (IKS):

TEXT BOOKS:

1. B.S. Grewal, "Higher Engineering Mathematics", 44th Edition, Khanna Publishers, New Delhi, 2017.
2. Kanti B Datta, Varma, P Sekhar, "Calculus, Linear Algebra and Ordinary Differential Equations", 1st Edition, Cengage Learning, 2024.

REFERENCE BOOKS:

1. Erwin Kreyszig, "Advanced Engineering Mathematics", 10th Edition, Wiley, 2011.
2. H.K. Dass, "Advanced Engineering Mathematics", S. Chand & Company Ltd., 2014.
3. David C. Lay, "Linear Algebra and Its Applications", 5th Edition, Pearson, 2015.

22PY102 APPLIED PHYSICS

Hours Per Week :

L	T	P	SL	C
3	0	2	3	4

PREREQUISITE KNOWLEDGE: Basics of calculus, Atomic structure and fundamentals of semiconductors.

COURSE DESCRIPTION AND OBJECTIVES:
This course identifies the principles of fluid mechanics and apply them in engineering applications. It provides in-depth understanding of the fundamental concepts of Quantum Mechanics. It emphasizes on the principles and applications of nanomaterials as relevant to an engineer. It enunciates the concurrent understanding of lasers and optical fibers in latest technology developments.

MODULE-1

UNIT-1 **18L+0T+12P+18SL = 48 Hours**

INTRODUCTION TO FLUID MECHANICS:
Properties of fluids-types of fluid flows, Basic fluid statics and pressure distribution, Bernoulli's principle. Fluid Dynamics: Nature of fluids, Newton's law of viscosity, Concept of Newtonian and Non-Newtonian fluids, Boundary layer formation and separation- Reynold's number and flow classification- Naiver stokes equation (Qualitative), Continuity equation and conservation laws, Dimensional analysis and scaling.

UNIT-2

INTRODUCTION TO QUANTUM MECHANICS:
Introduction to Quantum Mechanics, Concept of wave and particle duality of radiation, de Broglie's concept of matter waves, Schrödinger's time-independent wave equation, Eigen values and Eigen functions, Particle confined in a one-dimensional infinite potential well, Finite potential well, Quantum Tunneling: Scanning tunneling microscope. ***Kanada's atomic theory (paramanu)***

PRACTICES:

- Measurement of the discharge through a Venturimeter.
- Bernoulli's Apparatus: To verify Bernoulli's theorem.
- Planck's constant: Determination of stopping potential to evaluate the Planck's constant by photoelectric effect method.
- Determination of the Reynolds number.
- SEEBECK effect.

MODULE-2

UNIT-1 **27L+0T+18P+27SL = 72 Hours**

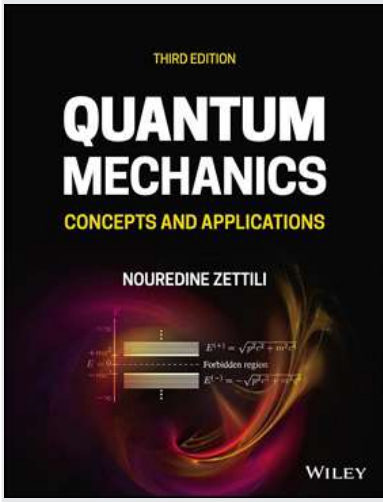
ELEMENTS OF NANOMATERIALS:
Introduction, Principles of nanomaterials; Synthesis of nanomaterials, Top- down and bottom-up approaches, Sputtering method, Sol-Gel method, Physical and chemical properties of nanomaterials, Medical applications of nanomaterials.

UNIT-2

LASERS:
Introduction, Spontaneous and stimulated emissions, Einstein coefficients, Population inversion and pumping processes, He-Ne laser and Nd-YAG laser; Applications of lasers in medical field (LASIK surgery and Cancer treatment), Implications of lasers. ***vahamihira's optics.***

UNIT-3

FIBRE OPTICS:
Introduction, Principle of optical fibers, Acceptance angle and numerical aperture, Types of optical fibers, Step index fibers and graded index fibers, Losses in optical fibers (qualitative); Applications of optical



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SKILLS:

- ✓ *Apply the dynamics of fluids to realize various potential applications in engineering.*
- ✓ *Apply the quantum laws to understand the microscopic systems.*
- ✓ *Demonstrate the synthesis and characterization of nanomaterials in view of their applications.*
- ✓ *Evaluate the concepts of lasers and optical fibers to realize versatile applications in Science, Engineering and Technology.*

fibers (Endoscope and Biosensor), Food quality and safety monitoring. ***Shulbasutras geometry***

PRACTICES:

- Laser: Determination of wavelength of a given laser source.
- Optical fiber: Determination of numerical aperture and acceptance of an optical fiber.
- Solar cell: Determination of efficiency of solar cell (Non relevant).
- Energy band gap of nanomaterials (DRS method).
- Synthesis of nanoparticles using Sol-Gel method.
- Synthesis of nanomaterials using Sputtering method.
- Determination of attenuation in Optical fiber.
- Determination of the slit width from Fraunhofer diffraction pattern using LASER beam.
- Demonstration of monochromatic nature of laser light comparing with ordinary light by the principle of dispersion using prism.

ACTIVITIES:

- Determination of the viscosity of a given biological fluid.
- Wave-particle duality demonstration using lasers.
- Synthesis of various nanomaterials.
- Determination wavelengths of different lasers.
- Evaluation of attenuation in optical fibers.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Mapping with POs
1.	Apply the principles of fluid mechanics and dynamics in biological systems.	Apply	1,2,3,4,5,9
2.	Apply the principles of quantum mechanics to unravel the latest technical developments.	Apply	1,2,3,4,8,9
3.	Evaluate the dimensions of nanoparticles to consolidate the physical and chemical aspects of nanomaterials.	Evaluate	1,2,3,4, 5,6,9
4.	Analyze the wavelengths of Lasers and to realize their applications in modernistic technologies.	Analyze	11,2,3,4, 5,8,9,11
5.	Recognize the versatility of optical fibers to perceive their applications in engineering.	Analyze	1,2,3,4, 6,8,9

MAPPING OF SUSTAINABLE DEVELOPMENT GOALS (SDGS) AND INDIAN KNOWLEDGE SYSTEM (IKS):

TEXTBOOKS:

1. N. Zettili, “Quantum Mechanics: Concepts and Applications”, Wiley, 3rd Edition, 2022.
2. T. Pradeep, “A Text Book of Nanoscience and Nanotechnology”, Tata McGraw Hill, 2012.

REFERENCE BOOKS:

1. D. Halliday, R. Resnick, J. Walker, “Fundamentals of Physics”, John Wiley and Sons, 11th Edition 2018.
2. M.N.Avadhanulu, P.G.Kshirsagar, T.V.S. Aruen Murthy, “A Text Book of Engineering Physics”, S. Chand & Company Ltd., 11th Edition 2019.
3. M. R. Srinivasan, “Engineering Physics”, New Age International Publishers, 2nd Edition 2021.
4. A. Ghatak, ‘’Optics’’, Tata McGraw Hill, 7th Edition, 2020.
5. Thamer A. Tabbakh, ‘’Optical Fiber and Applications’’, IntechOpen, 2023.
6. Poonam Mishra, Partha Pratim Sahu, ‘’Biosensors in Food Safety and Quality’’, CRC Press, 1st edition, 2022.
7. R. W. Fox, A. T. McDonald, Introduction to Fluid Mechanics, Wiley India Edition, John Wiley & Sons, 2015.

22CT103 ORGANIC CHEMISTRY

Hours Per Week :

L	T	P	SL	C
3	0	2	3	4

PREREQUISITE KNOWLEDGE: Intermediate level knowledge of chemistry

COURSE DESCRIPTION AND OBJECTIVES:

This course is aimed at offering fundamental concepts of organic chemistry which will help to design and synthesize organic compounds and understand their properties. This course will make the student familiar with basic concepts of bonding, reaction intermediates and stereo chemical aspects applicable in synthetic organic chemistry and organic materials. As a first-level course for B. Tech. students with biology background, it will be a strong basis to understand advanced level mechanistic aspects of biochemical reactions and also synthesis of organic molecules with medicinal value.

MODULE-1

UNIT -1 **18L+0T+12P+18SL = 48 Hours**

CHEMICAL BONDING:

Introduction to Lewis dot structures, VBT and VSEPR theory, Molecular Orbital (MO) theory, MO diagrams of N2, O2, CO, energy diagram of Ethylene.

UNIT-2

STEREOCHEMISTRY:

Representations of 3-Dimensional structures; Structural isomers and Stereoisomers; Chirality, optical isomerism - Enantiomers – Lactic acid (***dahi***) and Diastereomers – Tartaric acid (***imli***); Absolute configurations (R/S); Conformational analysis – Ethane.

PRACTICES:

- Determination of melting point of organic compounds.
- Determination of boiling point of organic compounds.
- Separation of organic compounds by thin layer chromatography (TLC).
- Paper Chromatography for Identification of Amino acids from the mixture.
- Synthesis of Racemic BINOL using solvent free methods (Concept of atropisomerism).
- Relevance of stereochemistry in biology eg. Thalidomide.

MODULE-2

UNIT-1 **27L+0T+18P+27SL = 72 Hours**

REACTION INTERMEDIATES:

Bond fissions, arrow-pushing for drawing mechanism, formation and reactivity of carbanions, carbocations, free radicals, carbenes (Aldol condensation, Friedel-Crafts Alkylation & Acylation, Halogenation of Methane, Reimann-Tiemann reaction).

UNIT-2

ORGANIC REACTIONS AND MECHANISM:

Organic reactions: Mechanisms for substitution (SN1 vs SN2), addition (Electrophilic and Nucleophilic), Elimination (E1and E2) reactions; Oxidation (Jones reagent) and reduction (LiAlH4); Introduction to catalytic hydrogenation.

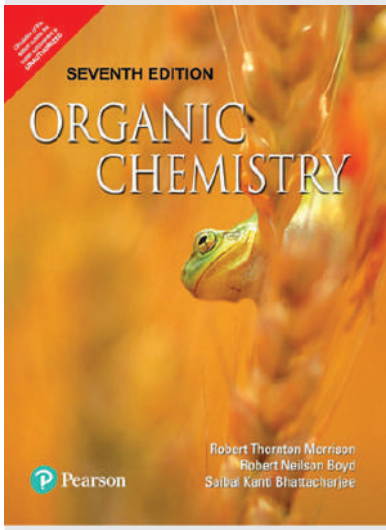
UNIT-3

STRUCTURAL ELUCIDATION OF ORGANIC COMPOUNDS:

IR Spectroscopy: Introduction, principle, identification of functional groups.

NMR spectroscopy: Introduction, principle, chemical shift, H-NMR (Ethyl alcohol and other simple molecules).

Mass spectrometry: Introduction, principle, fragmentation of simple molecules (nitrogen rule).



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SKILLS:

- ✓ *Design a scheme for an organic reaction.*
- ✓ *Analyze complex problems and predict reaction outcomes.*
- ✓ *Identify the stereochemical feature of a molecule based on the structure.*
- ✓ *Choose the desired green solvent required for a reaction.*
- ✓ *Analyse the desired product, side product and impurities formed during the course of the reaction pathway.*

PRACTICES:

- Preparation and characterization of Aspirin/Paracetamol using IR.
- Oxidation of an organic compound using Potassium Permanganate (KMnO4).
- Reduction of aldehydes using Sodium Borohydride (NaBH4).
- Estimation of the amount of glucose present in the given solution.
- Qualitative analysis of Phytochemicals - Alkaloids/Flavonoids.
- Preparation of dibenzal acetone.
- Analysis and characterisation of Functional groups – Carboxylic acids/ Carbonyl compounds / Amines.

COURSEOUTCOMES:

Upon successful completion of this course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Mapping with POs
1	Apply the theories of bonding to predict the formation of products in organic reactions.	Apply	1, 2, 7, 9, 11
2	Identify the stereochemical features of organic molecules and their importance of chirality with relevance to biological activity.	Analyze	1, 2, 3, 6, 7, 8, 9
3	Analyze the formation and reactivity of different reaction intermediates in organic reactions.	Analyze	1, 2, 3, 7, 8, 9, 11
4	Analyze various synthetic reactions for preparation of drug molecules.	Analyze	1, 2, 3, 6, 7, 8, 9, 11
5	Verify the structure of organic compound using the principles of instrumental techniques for structure determination.	Evaluate	1, 2, 4, 5, 8, 9, 11

MAPPING OF SUSTAINABLE DEVELOPMENT GOALS (SDGS) AND INDIAN KNOWLEDGE SYSTEM (IKS):

TEXT BOOKS:

1. Arun Bahl and B.S. Bahl, “Advanced Organic Chemistry”, Fifth Edition, S. Chand & Co, 2015.
2. R.T. Morrison, R.M. Boyd and S.K. Bhattacharjee, “Organic Chemistry”, 7th edition, Pearson Publications, 2018.

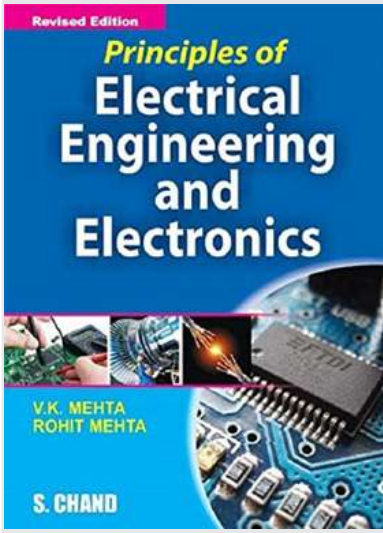
REFERENCE BOOKS:

1. P. Bruice, Organic Chemistry, Pearson Scientific Publications, 8th Edition. 2020.
2. J. David Rawn and Robert Ouellette, “Organic Chemistry: Structure, Mechanism, Synthesis”, 2nd edition, Academic Press, 2018.
3. Graham Patrick, “A Very Short Introduction to Organic Chemistry”, Oxford Publishers, 2017.
4. D.L. Pavia, G.M. Lampman, G.S. Kriz, R.G. Engel, A microscale approach to Organic Laboratory Techniques, 6th addition, Brooks/Cole, 2017.
5. Silverstein, Robert M. Bassler, G. Clayton Morrill and C. Terence, “Spectroscopic Identification of Organic Compounds”, 8th Edition, John Wiley & Sons Inc, 2014.
6. J. Mendham, R. C. Denney, J.D. Bares, M. Thomas and B. Siva Sankar, “Vogel’s Text book of qualitative Chemical Analysis”, Pearson Publications - Volume I, 2009.
7. L. Finar, “Organic Chemistry”, Vol–I, 6th edition, Longman Scientific Publications, 2006.
8. Vogel’s Practical Organic chemistry. 5th edition, Pearson India, 2003.

22EE102 FUNDAMENTALS OF ELECTRICAL AND ELECTRONICS ENGINEERING

Hours Per Week :

L	T	P	SL	C
2	0	2	2	3



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PREREQUISITE KNOWLEDGE: Basics of Physics.

COURSE DESCRIPTION AND OBJECTIVES:

This course provides an insight into the functioning of basic electrical components like resistor, inductor and capacitor. It deals with the constructional and operational details of static machines. It also deals with the basic electronic components like P-N junction diode, Zener diode.

MODULE-1

UNIT-1 **12L+0T+12P+12SL = 36 Hours**

Trigonometric Functions: Introduction to basic trigonometric functions.

Phasors: Phasor representation of sinusoidal voltage and current signals, Conversion of Polar to Rectangular form and Vice versa. Phasor diagrams and their interpretation. Phasor addition, subtraction, and multiplication. Conversion between phasor and time-domain representations.

Differentiation, Integration, and Applications: Basic concepts of calculus, Differentiation: Rates of change, derivatives of basic functions, Integration: Finding areas under curves, indefinite and definite integrals.

UNIT-2
FUNDAMENTALS OF ELECTRIC CIRCUITS:

Terminal characteristics of Active Elements (Ideal voltage, current source) and passive elements (Resistor, Inductor and Capacitor), Ohm's Law and Kirchhoff's Laws, Series and parallel circuits, Voltage and current division, Power and energy calculations, calculating areas of waveforms, finding total charge, energy and Power, Introduction to circuit analysis techniques (Mesh and Nodal analysis).

PRACTICES:

- Verification of Ohm's law.
- Verification of Kirchhoff's current law.
- Verification of Kirchhoff's voltage law.
- Measurement of power and Energy in resistive circuit.

MODULE–II

UNIT- 1 **18L+0T+18P+18SL = 54 Hours**

ANALYSIS OF AC CIRCUITS:

Generation of AC voltage, Frequency, Average value, R.M.S. value, Form factor, Peak factor for sinusoidal only; Analysis of single- phase ac circuits consisting of R, L, C, RL, RC (series and parallel).

UNIT-2

FUNDAMENTALS OF ELECTROMAGNETISM AND TRANSFORMERS:

Magnetic circuits- Ohm's law in Magnetic circuit (Magneto motive force, Reluctance and Flux), Analogy of Electrical and Magnetic circuits, Faraday's Law of Electromagnetism, Self and mutual inductances.

Principle of operation of single phase transformer, Constructional features, EMF equation (simple numerical problems).

UNIT- 3

SEMICONDUCTOR DEVICES:

Classification of semiconductors, P-N junction diode -operation and its characteristics, Half wave rectifier - operation, efficiency; Full wave rectifiers -types, operation, efficiency; Zener diode and its characteristics, Zener diode as Voltage regulator.

PRACTICES:

- Determination of R.M.S. Values of sinusoidal waveform.
- Verification of PN junction diode characteristics under both forward and reverse bias.
- Verification of Zener diode characteristics under reverse bias.
- Transformation ratio of a single phase transformer at different loads.
- Determination of impedance in complex AC circuits.

COURSE OUTCOMES:

Upon successful completion of the course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Mapping with POs
1	Solve the AC and DC circuits using different methods.	Apply	1,2,9,11
2	Analyze the resistive circuits with independent sources and find its solution.	Analyze	1,2,6,9
3	Examine the different electrical equipment.	Evaluate	1,2,9,11
4	Acquire the knowledge of semiconductor devices to create circuits.	Create	1,2,3,9,11

MAPPING OF SUSTAINABLE DEVELOPMENT GOALS (SDGS:

TEXTBOOKS:

1. V. K. Mehta, "Principles of Electrical Engineering and Electronics", S. Chand & Co., Publications, New Delhi, 2019.
2. Anthony Croft and Robert Davison, "Mathematics for Engineers: A Modern Interactive Approach," Pearson/Prentice Hall, 2008.

REFERENCE BOOKS:

1. Millman and Halkias, "Electronic Devices and Circuits", Mc Graw Hill, 2006.
2. D.P. Kothari, "Basic Electrical and Electronics Engineering", TMH, New Delhi, 2017.

22ME101 ENGINEERING DRAWING

Hours Per Week :

L	T	P	SL	C
2	0	2	2	3

PREREQUISITE KNOWLEDGE: Basics of Geometry.

COURSE DESCRIPTION AND OBJECTIVES:
This course provides a foundational understanding of engineering drawing, focusing on basic projections, dimensioning, and reading technical drawings relevant across various engineering disciplines. The objective is to equip learners with essential skills to visualize, interpret, and communicate design ideas effectively using standard drawing practices.

MODULE-1

UNIT-1 **12L+0T+12P+12SL = 36 Hours**

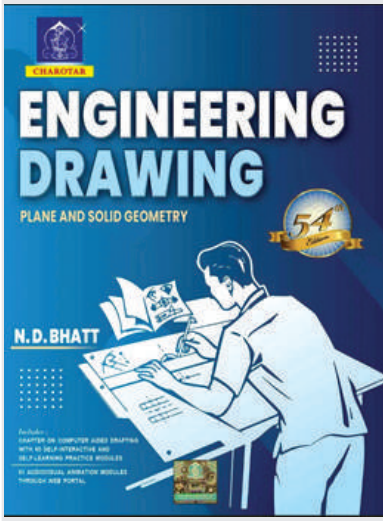
GEOMETRICAL CONSTRUCTIONS AND CONICAL CURVES:
Introduction: Lettering and Dimensioning, Types of Lines.
Geometrical Constructions: Regular polygons using angle, ARC and general methods. Conical Curves: Construction of ellipse, parabola and hyperbola by using eccentricity method.
Śulba Sūtras (Vedic Geometry)

UNIT-2

PROJECTION OF POINTS AND STRAIGHT LINES:
Introduction: Reference planes, importance of reference lines and planes; Principles of projection.
Projection of Points: Projection of points located in any of the four quadrants.
Projection of Straight Lines: Projection of straight lines - parallel to both the reference planes, parallel to the one plane and inclined to other plane, parallel to one plane and perpendicular to other plane.

PRACTICES:

- A road roller covers 'x' kilometres distance in one day & the roller completed 'N' revolutions in a minute. By using the above information, inscribe a regular hexagon and pentagon in a circle of diameter, D. Where 'D' is considered as the diameter of the road roller. Also evaluate the length of each side of the regular hexagon and pentagon.
- A cow is tethered in the middle of a field which is in the form of circular shape and suppose that cow grazes 'x' square meters in a day. By using the above information, inscribe regular hexagon and pentagon in a circle of diameter 'D'.
- Two oranges on a tree are respectively x m and y m above the ground, and p m and q m from a r m thick wall, but on the opposite sides of it. The distance between the oranges, measured along the ground and parallel to the wall is 'L' m. (a) Determine the real distance between the oranges and the angle of inclination of the line joining the oranges with the ground and also with the wall.
- A room measures 'x' m long, 'y' m wide and 'z' m height. Assume (x>y>z). An electric bulb hangs in the centre of the ceiling and 'p' m below it. A thin straight wire connects the bulb to a switch kept in one of the corners of the room and 'r' m above the floor. Draw the projections.
- On lighting a rocket cracker, it gets projected in a parabolic path and reaches a maximum height of 'x' m when it is 'y' m away from the point of projection. Finally, it reaches the ground 'z' m away from the starting point. Find the angle of projection.
- Two pegs fixed on a wall are 'x' meters apart. The distance between the pegs measured parallel to the floor is 'y' meters. If one peg is 'z' meters above the floor. Consider (x>y>z) & assume suitable scales. Design the height of the second peg and the inclination of the line joining the two pegs with the floor. Develop the projections.



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SKILLS:

- ✓ *Convert iso-metric views of objects into orthographic views and vice versa.*
- ✓ *Visualize the shape of the 3D components.*
- ✓ *Create pictorial views by using AutoCAD.*
- ✓ *Understand projections by visualization.*

MODULE-2

UNIT-1 **18L+0T+18P+18SL = 54 hours**

PROJECTIONS OF PLANES:
Regular planes perpendicular to one reference plane and inclined to the other reference plane.

UNIT-2

PROJECTIONS OF SOLIDS:
Axis parallel to one reference plane and inclined to other plane - prisms, pyramids.

UNIT-3

CONVERSION OF ISOMETRIC PROJECTIONS TO ORTHOGRAPHIC PROJECTIONS:
Conversion of isometric views of geometrical shapes, and simple orthographic views.

PRACTICES:

- A plate having shape of an isosceles triangle has base 'x' mm long and altitude 'y' mm. It is so placed that in the front view it is seen as an equilateral triangle of 'x' mm sides and one side inclined at an angle 'θ' degrees to the reference line. Develop its front view and top view.
- Prepare the top-view (plan) of a class-room/lab, home (Drawing Room/Bedroom/ Study Room, Kitchen) along with suitable dimensions.
- A lighting point in a ceiling design is 0 mm above the HP and 50 mm in front of the VP (i.e., lies exactly on HP). Draw views and mark the location. Explain what it means physically.
- A sensor mounted on a panel lies 22 mm below the panel surface (HP) and 60 mm in front of the operator (VP). Draw the reference line and mark views. Justify point placement.
- You are given an isometric view of an L-shaped bracket with holes and steps. Draw the orthographic views (Front, Top, and Right Side views).

ACTIVITIES:

- Developing the following solids with the help of cardboard/ thick paper, cube, cuboid prisms & pyramids (triangular, square, pentagonal, and hexagonal) right circular cylinder and cone.
- Design a Bolt and nut assembly for the given dimensions.
- Design a Connecting rod of IC engine for the given dimensions.
- Design a I.C Engine Piston with piston rings for the given dimensions.

COURSE OUTCOMES:
Upon successful completion of the course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Mapping with POs
1	Creating and interpreting technical drawings.	Apply	1,3,5
2	Apply the drawing skills in representing various geometrical features.	Apply	1,3,5
3	Develop orthographic projections and isometric views of various objects using AutoCAD.	Analyse	1,3,5
4	Sketch simple objects and their pictorial views using Auto-CAD.	Analyse	1,3,5

MAPPING OF SUSTAINABLE DEVELOPMENT GOALS (SDGS) AND INDIAN KNOWLEDGE SYSTEM (IKS):

TEXTBOOK:

1. N D Bhatt, "Engineering Drawing", 54th edition, Charotar Publication, 2023.

REFERENCE BOOKS:

1. S. N. Lal, "Engineering Drawing with an Introduction to Auto CAD", 1st edition, Cengage, 2017.
2. K L Narayana, "Engineering drawing", 2nd edition, SciTech Publications, 2014.

22CS101 PROGRAMMING IN C

Hours Per Week :

L	T	P	SL	C
2	0	4	2	4

PREREQUISITE KNOWLEDGE: Fundamentals of Problem Solving.

COURSE DESCRIPTION AND OBJECTIVES:

This course is aimed to impart knowledge on basic concepts of C programming language and problem solving through programming. It covers basic structure of C program, data types, operators, decision making statements, loops, functions, strings, pointers, structures and unions. At the end of this course, students will be able to design, implement, test and debug complex problems using features of C.

MODULE-1

UNIT-1 **12L+0T+24P +12SL=48 Hours**

INTRODUCTION TO ALGORITHMS AND PROGRAMMING LANGUAGES:

Introduction to Algorithms: Introduction to computational thinking – Problem solving with algorithms and flowcharts - Introduction to C: Structure of a C program - pre-processor statement) inline comments, variable declaration statements, executable statements; C Tokens - C character set, identifiers and keywords, type qualifiers, type modifiers, variables, constants, punctuations and operators.

Data Types and Operators: Basic data types; Formatted I/O; Reading and writing characters; Operators - assignment, arithmetic, relational, logical, bitwise, ternary, address, indirection, sizeof, dot, arrow, parentheses operators; Expressions - operator precedence, associative rules.

Control Statements: Introduction to category of control statements; Conditional branching statements - if, if– else, nested-if, if – else ladder, switch case;

Iterative statements - for, while, do - while, nested loops; Jump statements - break, jump, goto and continue.

Algorithmic logic in Panini's Ashtadhyayi; problem-solving in Indian logic ***(Nyaya Shastra)***, Structured numerical systems – Vedic mathematics and early binary concepts

UNIT-2

FUNCTIONS & POINTERS:

User-defined functions: Function declaration - definition, header of a function, body of a function, function invocation; Call by value, Call by address. Recursion; Library Functions; Storage classes; Scope of a variable.

Pointers: Declaration, Initialization, Multiple indirection, Pointer arithmetic.

Recursive hymns ***(Rigveda),*** modular constructs in Shastra classification, Concepts of abstraction and references in Indian epistemology ***(Pramana).***

MODULE-2

UNIT-1 **18L+0T+36P +18SL=72 Hours**

ARRAYS:

Arrays: Introduction; Types of arrays; Single dimensional array - declaration, initialization, usage, reading, writing, accessing, memory representation, operations; Multidimensional arrays. Passing arrays to functions; Relationship between arrays and pointers, scaling up - array of arrays, array of pointers, pointer to a pointer and pointer to an array; Dynamic memory allocation functions – Creating arrays dynamically and performing operations on them.

Representation of multidimensional data in ancient Indian astronomy and calendar systems Granularity and scalability in system design found in traditional architecture (e.g., ***Vastu***).

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SKILLS:

- ✓ *Analysis of the problem to be solved.*
- ✓ *Select static or dynamic data structures for a given problem and manipulation of data items.*
- ✓ *Develop C programs that are understandable, debuggable, maintainable and more likely to work correctly in the first attempt.*

UNIT-2

STRINGS:

Strings: Character array, reading strings from the standard input device, displaying strings on the standard output device, Importance of terminating a string, Standard string library functions.
Preservation and transmission of Sanskrit and Tamil texts using structured phonetic systems.

UNIT-3

STRUCTURES, UNIONS:

Structures: Defining a structure, declaring structure variable, Operations on structures, Pointers to structure - declaring pointer to a structure, accessing structure members using pointer; Array of structures, Nested structures, passing structures to functions - passing each member of a structure as a separate argument, passing structure variable by value, passing structure variable by reference/ address; Typedef and structures.
Unions: Defining a union - declaring union variable, operations on union.
Classification of knowledge in Indian systems – Charaka Samhita, Manuscripts, Palm-leaf layouts, Group representation in indigenous knowledge frameworks – e.g., Ayurveda Tridosha classification.

COURSE OUTCOMES:

Upon successful completion of the course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Mapping with POs
1	Explain algorithmic problem-solving, flowchart design, and fundamental programming constructs in C.	Apply	1, 2
2	Analyze and implement various control structures (conditional, iterative, and jump statements) for effective decision-making in programs.	Analyze	2, 3, 4
3	Implement modular programming by designing user-defined functions and utilize recursion effectively for problem-solving. Apply array concepts, including single and multi-dimensional arrays, dynamic memory allocation, and pointer-array relationships in programming.	Apply	1, 2, 3, 4, 5
4	Utilize string handling techniques and standard string library functions to solve text-processing problems effectively.	Evaluate	1, 2, 3, 5
5	Design, implement, and analyze structured data types using structures and unions for efficient handling of complex data.	Create	1, 2, 3, 5

MAPPING OF SUSTAINABLE DEVELOPMENT GOALS (SDGS) AND INDIAN KNOWLEDGE SYSTEM (IKS):

TEXTBOOKS:

1. Behrouz A. Forouzan, Richard F.Gilberg, “Programming for Problem Solving”, 1st edition, Cengage publications, 2019.
2. Ajay Mittal, “Programming in C - A Practical Approach”, 1st edition, Pearson Education, India, 2010.

REFERENCE BOOKS:

1. 1. R.G. Dromey, “How to Solve it by Computer”, Prentice-Hall International Series in Computer Science, USA.
2. Reema Thareja, “Computer Fundamentals and Programming in C”, 1st edition, Oxford University Press, India, 2013.
3. Herbert Schildt, “C: The Complete Reference”, 4th edition, Tata McGraw-Hill, 2017.
4. Byron S Gottfried, “Programming with C”, 4th edition, Tata McGraw-Hill, 2018.

22EN103 ENGLISH PROFICIENCY AND COMMUNICATION SKILLS

Hours Per Week :

L	T	P	SL	C
0	0	2	0	1

PREREQUISITE KNOWLEDGE: Basics of grammar, Read and understand for global context, Cultural sensitivity and Basic writing skills.

COURSE DESCRIPTION AND OBJECTIVES:
English Proficiency and Communication Skills seeks to develop the students' abilities in listening, speaking, reading, writing and grammar. The course will provide students an exposure on a wide range of language use in everyday situations. It will make the students to equip with functional English and make them use it confidently in their professional and social contexts. Finally, students will strengthen their listening, speaking, reading, writing skills in English.

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MODULE-1

UNIT-1 **0L+0T+12P +0SL=12 Hours**

MY LIFE AND HOME – MAKING CHOICES – HAVING FUN:

Listening: Understanding short monologues or dialogues and choose the correct visual.

Speaking: Self-introduction, agreeing, disagreeing, making decision, cultural matters in a limited way.

Reading: Understanding main message, factual information global meaning, specific information and paraphrasing.

Writing: Developing hints-based mail, Writing short messages/paragraphs.

Vocabulary: Discerning use of right word suiting the context, B1 Preliminary word list.

Grammar: Frequency Adverbs, State Verbs and Prepositions. In Indian philosophies like ***Vedanta, Sankhya,*** and ***Yoga,*** the concept of cyclical time is fundamental. the ***Atman*** (soul) is eternal and always present. In Indian agriculture, astrology, and spirituality, the regular appearance of seasons or celestial events often translates to frequency. (Life on Earth, governed by cycles of karma and rebirth, reflects actions that happen at varying intervals).

UNIT-2

ON HOLIDAY – DIFFERENT FEELINGS – THAT'S ENTERTAINMENT:

Listening: Understand straightforward instructions or public announcements.

Speaking: Describing people, things and places in a photograph, making suggestions, discussing plans.

Reading: Longer text for detailed comprehension, gist and inference.

Writing: Developing notes and responding to penfriends or 'e-pals'.

Vocabulary/Grammar – Comparatives and Superlatives, Gradable and non-gradable adjectives, Cloze tests.

PRACTICES:

- Developing hints based mail.
- Writing short messages.
- Writing paragraphs.
- Expressing opinions and cultural matters.

SKILLS:

- ✓ *Use of appropriate grammar and vocabulary with syntactic patterns in short texts.*
- ✓ *Read and extract the main message, global meaning, specific information, detailed comprehension, understanding of attitude, opinion and writer purpose and inference.*
- ✓ *Listen to understand key information, specific information, gist and detailed meaning and to interpret meaning.*
- ✓ *Understand questions and make appropriate responses and talk freely on everyday topic.*

- Understanding short monologues.
- Understanding straightforward instructions and public announcements.
- Describing people, things and places in a photograph.

MODULE-2

UNIT-1 **0L+0T+18P +0SL=18 Hours**

GETTING AROUND – INFLUENCES:

Listening: Discussion activities and listening to understand the gist of each short dialogue.

Speaking: Snap Talks, Make and respond to suggestions, discuss alternatives and negotiate agreement.

Reading: Reading for understanding coherence of the text and drawing inferences.

Writing: Reading an announcement from a magazine or website for preparing an article.

Vocabulary / Grammar: Punctuation, Prepositions, (Mount Meru, in Hindu, Buddhist, and Jain cosmology, is considered the center of the universe, and many deities are believed to reside on its peaks). Phrasal Verbs, B1 Preliminary word list.

UNIT-2

STAY FIT AND HEALTHY – LOOKS AMAZING!

Listening: An interview for a detailed understanding of meaning and to identify attitudes and opinions.

Speaking: Discuss likes, dislikes, experiences, opinions, habits, etc.

Reading: Content, Communicative Achievement, Organisation and Language.

Writing: Developing a story with clear links to the given opening sentence.

Vocabulary / Grammar: Modals, Conditionals, Indian philosophy, particularly in Hinduism, Buddhism, and Jainism, the law of karma is central to understanding the relationship between actions and their consequences. Verb forms (Time and Tense).

UNIT-3

THE NATURAL WORLD – EXPRESS YOURSELF!

Listening: Listening for specific purpose, listening for identifying the situation.

Speaking: Discussing sports, discussing everyday objects in photos, talking about habits and routines.

Reading: Reading to identifying text purpose, Identifying opinion and attitude.

Writing: Reported speech, using range of tenses.

Vocabulary / Grammar: Collocations, Adjective Prefixes and Suffixes.

PRACTICES:

- Listening to understand the gist of each short dialogue.
- Listening to an interview for a detailed understanding of meaning and to identify attitudes and opinions.
- Preparing an article.
- Discuss for alternatives and negotiate agreement.
- Discussion on likes, dislikes, experiences, opinions, habits, etc.

ACTIVITIES:

- Snap talks.
- Making and responding suggestions.
- Discussion on likes, dislikes, experiences, opinions, habits, etc.
- Description of people, things and places in a photograph.

COURSE OUTCOMES:

Upon successful completion of the course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Mapping with POs
1	apply to read and grasp content on a range of topics/texts related to their everyday life like notifications, advertisements, travel brochures, news reports, articles.	Apply	7, 8, 9, 10, 11
2	apply suitable strategies to achieve comprehension, like listening for main points and checking comprehension using contextual clues etc.	Apply	7, 8, 9, 10, 11
3	demonstrate vocabulary beyond that of the familiar subjects.	Analyze	7, 8, 9, 10, 11
4	show sufficient control of English grammar and sentence variety to coherently organize information at sentence and discourse levels.	Evaluate	7, 8, 9, 10, 11
5	use functional English to communicate and interact effectively in everyday situations.	Create	7, 8, 9, 10, 11

MAPPING OF SUSTAINABLE DEVELOPMENT GOALS (SDGS) AND INDIAN KNOWLEDGE SYSTEM (IKS):

TEXTBOOK:

1. Emma Heyderman and Peter May, “Complete Preliminary”, Student’s Book with Answers, 2nd edition, Cambridge University Press, 2019.

REFERENCE BOOKS:

1. Annette Capel and Rosemary Nixon, “Introduction to PET”, Oxford University Press, 2009.
2. Adrian Doff and Craig Thaine, “Empower Pre intermediate”, Cambridge University Press, 2015.
3. Louise Hashemi and Barbara Thomas, “Objective PET”, Cambridge University Press, 2010.

22CT101 ENVIRONMENTAL STUDIES

Hours Per Week :

L	T	P	SL	C
2	2	0	2	3

PREREQUISITE KNOWLEDGE: General awareness regarding environmental problems and importance of environmental protection.

COURSE DESCRIPTION AND OBJECTIVES:

It is a multidisciplinary subject where we deal with different aspects using a holistic approach. It is evolving to be the education for sustainable and ethical development both at a local and global level. It helps to prepare the next generation and to plan appropriate strategies for addressing environmental issues. It identifies and create solutions that conserve to manage ecosystem and biodiversity and also helps to eliminate pollutants, toxicants to preserve air, water and soil quality. Environmental education recognize impacts of global issues, enhances the public awareness and helps to take decisions towards environmentally responsible actions.

MODULE-1

UNIT-1 **12L+12T+0P+12SL=36 Hours**

SUSTAINABLE DEVELOPMENT, NATURAL RESOURCES AND ECOSYSTEMS:

Sustainable Development - Concept and Sustainable Development Goals. Natural Resources- Forest, water, energy, mineral and land resources. Concept of Ecology and Ecosystems, Ecological succession, Population Ecology.

UNIT-2

BIODIVERSITY AND ECOSYSTEM CONSERVATION:

Biodiversity concept, Biodiversity hot spots, Biodiversity indices (Simpson index and Shannon index) Threats to biodiversity, Biodiversity conservation (in-situ and ex-situ). ***Traditional Knowledge*** in biodiversity conservation, Ecosystem protection and its maintenance.

PRACTICES:

- Wealth from waste, (development of value-added products from waste materials).
- Biogas production.
- Herbarium sheet preparation.
- Models: wind mills, solar cell, bioenergy, Vertical garden, green building models.
- Preparation of Compost.
- Installation of artificial nests for local bird population.
- On campus plantation programme.
- Disposal of laboratory waste- Individual practice and report writing, lab safety awareness

MODULE-2

UNIT-1 **18L+18T+0P+18SL =54 Hours**

ENVIRONMENTAL ISSUES AND WASTE MANAGEMENT:

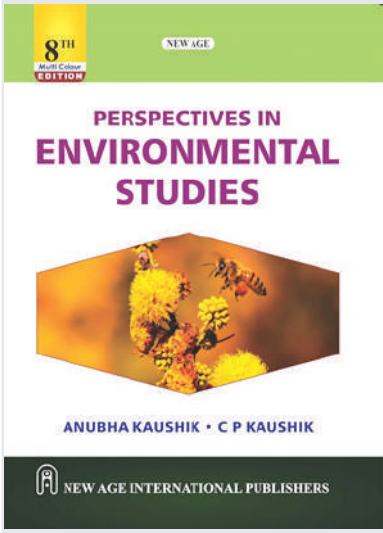
Emerging local and global environmental issues, Waste Management-Municipal, Industrial. Biomedical, hazardous and radioactive waste management, Waste-water treatment.

UNIT-2

ENVIRONMENTAL HEALTH AND SAFETY:

Occupational health and hygiene, Toxicity studies (Heavy metal toxicity, Tobacco, Silicosis, Xenobiotics and Carcinogenicity) and its remedy.

UNIT-3



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ADVANCED TECHNIQUES IN POLLUTION CONTROL:

Pollution control devices -Catalytic converters, Electrostatic precipitators, Scrubbers, Cyclonic separators, Gravitational settling chambers, Carbon capture technology, Water pollution technologies- membrane filtration, bioremediation, Bio manipulation technology.

PRACTICES AND FIELD PROJECT:

- Comparative analysis of water quality metrics to determine whether the water is suitable for irrigation and drinking purposes.
- Survey of flora and fauna in your own remote areas for assessment of local Biodiversity.
- Comparative study of traditional versus modern waste collection systems.
- Study on the effects of household items and detergents on the quality of the water.
- Detailed study of any environmental problem/situation, Identification of factors pertaining to that problem with conclusion.
- Study of agricultural runoff in crop lands of Angalakuduru and Sekuru.

COURSE OUTCOMES:

Upon successful completion of the course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Mapping with POs
1	Ability to apply knowledge, research skills and field techniques to protect environment.	Apply	2, 6, 9, 11
2	Examine the impacts of ecosystems, biodiversity and apply conservation strategies to curb the issues for sustainability	Apply	2, 6,9, 11
3	Survey on various waste management approaches and develop innovative solutions to solve the issues in the future	Evaluate	2, 3, 6,11
4	Create and implement useful skills to solve occupational health and environmental issues, ensuring safer work places and healthier communities	Apply	2,3, 6, 11
5	Analyse, design and implementation of sophisticated control system to manage industrial emissions and manage environmental pollutants	Analyse	1,2 3, 6,11

MAPPING OF SUSTAINABLE DEVELOPMENT GOALS (SDGS) AND INDIAN KNOWLEDGE SYSTEM (IKS):

TEXTBOOKS:

1. Anubha Kaushik and C. P. Kaushik, “Perspectives in Environmental Studies”, 8th edition, New Age International Publishers, 2024.
2. M. Anji Reddy, “Textbook of Environmental Science and Technology” B. S. Publications, 2023.

REFERENCE BOOKS:

1. B. Joseph, “Environmental Studies Simplified”, 3rd edition, Mc Graw Hill Education (India), 2024.
2. John Pichtel, “Waste Management Practices: Municipal, Hazardous, and Industrial”, 2nd Edition, Taylor and Francis Books India Pvt. Ltd, 2024.
3. Pankaj Gupta,” Environmental Health and Occupational Safety”. 1st Edition, Routledge Taylor and Francis group, 2024.
4. C. S. Rao, “Environmental Pollution Control Engineering”, New Age International Publishers, 2021
5. P.D. Sharma, “Ecology and Environment”,13th Edition, Rastogi publication, 2022.
6. Anil Kumar De, “Environmental Chemistry”, 10th Edition, New Age International Private Limited, 2022.

22MS101 MANAGEMENT STUDIES

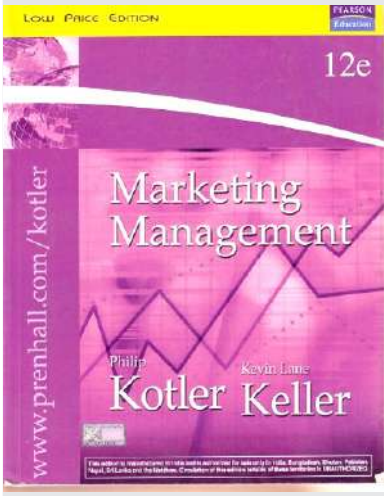
Hours Per Week :

L	T	P	SL	C
2	2	0	2	3

PREREQUISITE KNOWLEDGE: Management Fundamentals, Operations Management, Business Environment.

COURSE DESCRIPTION AND OBJECTIVES:

This course aims to provide foundational knowledge in the science of management by examining classical and modern management theories and their applications in business operations, HR, and marketing. The course equips students with tools to analyse markets, customers, and internal organizational processes, thereby enabling them to develop effective managerial strategies.



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MODULE-1

UNIT-1 **12L+12T+0P+12SL=36 Hours**

INTRODUCTION TO MANAGEMENT:

Concepts of Management and Organization – Nature, Importance and Functions – Evolution of Management Thought: Taylor's Scientific Management, Fayol's Principles, Administrative Theory, Mayo's Experiments. Theories of Motivation: Maslow and Herzberg. Leadership Styles. Corporate Social Responsibility from Indian Perspectives.

UNIT-2

OPERATIONS MANAGEMENT:

Plant Location Principles, Plant Layout Types, Productivity Measures, Project Management – Planning, Scheduling and Controlling, Inventory Control Techniques – EOQ, ABC Analysis, Stores and Purchase Management.

PRACTICES

- Design a management strategy for a Start-up using planning, organizing, leading, controlling.
- Conduct a leadership style analysis comparing crisis vs. stability periods.
- Prepare a CSR initiative aligned with Indian ethics and practices.
- Create a simplified Gantt chart for a semester project schedule.
- Compute EOQ for a sample product with demand, ordering, and holding cost data.
- Simulate inventory classification using ABC analysis for a retail store.
- Demonstrate statistical process control using chart data sets.
- Evaluate functions of management through a case study of a real-life business.

MODULE – II

UNIT-1 **18L+18T+0P+18SL=54 Hours**

HUMAN RESOURCE MANAGEMENT:

Concepts and Functions of HRM – Manpower Planning – Recruitment & Selection – Training & Development – Wage & Salary Administration – Promotion, Transfer and Separation – Performance Appraisal – Grievance Handling – Welfare Measures – Job Evaluation and Merit Rating, ***Ancient Gurukul systems,*** mentorship models, values-based leadership.

SKILLS:

- ✓ *Strategic Thinking and Managerial Decision-Making.*
- ✓ *Human Resource Planning and Administration*
- ✓ *Application of Operations and Inventory Techniques.*
- ✓ *Marketing Analysis and Digital Campaign Planning.*
- ✓ *Ethical and Sustainable Business Practices.*

UNIT-2

MARKETING MANAGEMENT:

Evolution and Functions – Selling vs. Marketing – 4Ps & 7Ps of Marketing – Product Mix & Life Cycle – Price Mix & Pricing Methods – Place Mix & Channels – Promotion Mix Tools – Packaging & Process in Marketing.

UNIT-3

EMERGING TRENDS IN BUSINESS MANAGEMENT:

Digital Transformation in Business – Role of AI in business, Remote & Hybrid Work Models, Digital Marketing Innovations, FinTech & Digital Payments, E-Commerce & Social Commerce.

PRACTICES:

- Draft a job description and specification for a chosen designation.
- Prepare an HR training calendar for a small business.
- Design a grievance handling mechanism with a workflow.
- Conduct a mock interview and document evaluation criteria.
- Analyze the marketing mix for a consumer product or service.
- Conduct a class debate on: "Is Digital Marketing replacing Traditional Marketing?"
- Analyze an Indian e-commerce platform's business model (e.g., Flipkart, Nykaa).
- Compare and contrast HR practices across two industry sectors.

COURSE OUTCOMES:

Upon successful completion of the course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Mapping with POs
1	Analyze core management principles and classical theories	Analyze	1,2
2	Apply operations management techniques	Apply	1,2,3
3	Evaluate human resource management practices	Evaluate	1,2
4	Evaluate the markets, customers and competition	Evaluate	1,2,3
5	Critically assess emerging trends such as digital transformation	Apply	1,2,3

MAPPING OF SUSTAINABLE DEVELOPMENT GOALS (SDGS) AND INDIAN KNOWLEDGE SYSTEM (IKS):

TEXTBOOKS:

1. Kotler Philip & Keller Kevin Lane, Marketing Management, 12th edition, PHI, 2005.
2. Koontz & Weihrich, Essentials of Management, 6th edition, TMH, 2005.
3. Aryasri, Management Science, 4th edition, TMH, 2004.

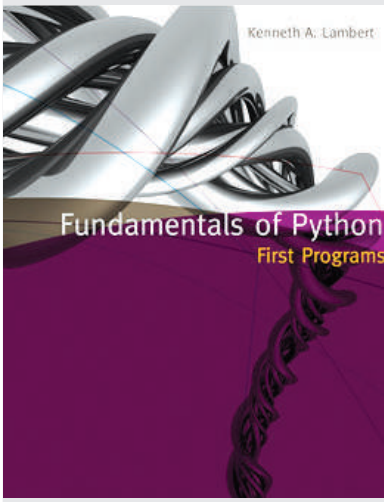
REFERENCE BOOKS:

1. Stoner, Freeman, Gilbert, Management, 6th edition, Pearson Education, 2018.
2. Thomas N. Duening & John M. Ivancevich, Management: Principles and Guidelines, Biztantra, 2003.

22CS102 PROBLEM SOLVING THROUGH PYTHON

Hours Per Week :

L	T	P	SL	C
2	0	2	2	3



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PREREQUISITE KNOWLEDGE: Prior knowledge of any programming language and object-oriented concepts is helpful but not mandatory.

COURSE DESCRIPTION AND OBJECTIVES:
This course offers sufficient knowledge required to understand the fundamental concepts of Python programming language. This course enables students to choose appropriate data structures (lists, dictionaries, tuples, sets, strings) for the given problem. In addition, the students will be able to create reliable, modular and reusable applications using Object- Oriented Programming approaches. At the end they will get an idea of how to access database using python programming, develop web applications, and using web Services using python Programming.

MODULE-1

UNIT-1 **12L+0T+12P+12SL=36 Hours**

INTRODUCTION:
Introduction to python, Variables, Assignment, Keywords, Built-in functions, Indentation, Comments, Basic data types - integers, float, complex, Boolean, strings; Python program development, running python using REPL shell, Python scripts.
Operators and Expressions: Operators- arithmetic operators, comparison (relational) operators, assignment operators, logical operators, bitwise operators, membership operators, identity operators; Expressions and order of evaluations.
Control Structures: Conditional control structures - if, else if, else; Loop control structures - for, while, for... else, while…else, nested loops, break, continue, pass.
Structured rule-based logic as in ***Panini's grammar;*** algorithmic thinking in ***Nyaya philosophy.***

UNIT-2

PYTHON DATA STRUCTURES AND FUNCTIONS:
Data Structures: Lists, Tuples, Sets, Strings, Dictionary - creation, accessing, basic operators and methods; List comprehensions.
Functions: Defining functions, calling functions, Passing arguments - keyword arguments, default arguments, positional arguments, variable-length arguments; Types of functions- anonymous functions, fruitful function, recursive functions; Scope of the variables- global and local variables, Development of recursive and non-recursive functions.
Recursive and modular thinking in Vedic systems; structured data modeling akin to Ayurveda and traditional knowledge.

MODULE-2

UNIT-1 **18L+0T+18P+18SL=54 Hours**

MODULES, PACKAGES AND OOPS:
Creating modules, Import Statement, From...Import Statement, Name Spacing, Creating user defined modules.
Standard Modules: sys, math, date, time, os, random and itertools modules.
Packages: Package Initialization, Importing * From a Package, Sub packages.
Modular organization of knowledge in Indian philosophical schools; abstraction in ancient systems like ***Arthashastra.***

UNIT 2

OBJECT ORIENTED PROGRAMMING:

Classes and Objects, Attributes and Methods, Constructors and Destructors- (init and del methods), Encapsulation - bundling of data and methods within a class, promotes data integrity and prevents unauthorized access, use of access modifiers to control access to attributes and methods; Inheritance, Method Overriding, Polymorphism, Abstraction, Class and Instance Variables - Differentiate between class variables (shared among all instances) and instance variables (unique to each instance), Access Modifiers-access modifiers and their role in controlling access to class members.

Operator Overloading: customization of operators for user- defined classes- define methods such as add, sub, mul, etc.

Traditional agricultural methods (Krishi-Parashara), Ayurveda-based healthcare practices.

UNIT-3

ERRORS AND EXCEPTIONS AND FILES:

Introduction to Exceptions, Handling Exception, Try Except Else and Finally Block, Raising Exceptions. File Processing: Reading and writing files -creating a new file, writing to a file, reading text files, opening and closing files, reading, writing, tell (), seek (), rename ().

Risk assessment in ancient Indian governance (Arthashastra); traditional knowledge documentation and preservation.

COURSE OUTCOMES:

Upon successful completion of the course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Mapping with POs
1	Analyze various features of programming language and their application in problem solving in computer programming to write, compile, and debug programs in python language.	Analyze	1,2
2	Make use of different data types to design programs involving decisions, loops, and functions.	Apply	1,2,5
3	Analyze the usage of different data structures for practical and contemporary applications for a given problem.	Analyze	1, 2, 3, 5
4	Choose appropriate programming paradigms, interrupt and handle exceptions using files to propose solution through reusable modules	Apply	1, 2, 3,5
5	Develop applications for a range of problems using object-oriented programming techniques.	Apply	1, 2,3,4,5

MAPPING OF SUSTAINABLE DEVELOPMENT GOALS (SDGS) AND INDIAN KNOWLEDGE SYSTEM (IKS):

TEXTBOOKS:

1. Kenneth A. Lambert, “The Fundamentals of Python: First Programs”, Cengage Learning, 2011.
2. Mark Lutz, “Learning Python”, 5th edition, Orielly Publishers, 2013.
3. Reema Thareja, ‘Python Programming using problem solving approach”, oxford university press,2017.

REFERENCE BOOKS:

1. Introduction to Computation and Programming Using Python. John V. Guttag, The MIT Press.
2. James Payne, “Beginning Python using Python 2.6 and Python 3”, Wrox publishing.
3. Paul Gries, “Practical Programming: An Introduction to Computer Science using Python 3”, The Pragmatic Bookshelf, 2nd edition, 4 Oct. 2013.
4. Allen B. Downey, “Think Python”, 1st edition, Orielly publishing.

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22EN104 TECHNICAL ENGLISH COMMUNICATION

Hours Per Week :

L	T	P	SL	C
1	0	2	1	2

PREREQUISITE KNOWLEDGE: Basic sentence formation, understanding contextual meanings, basic writing skills and moderate fluency in English.

COURSE DESCRIPTION AND OBJECTIVES:
In this course students will read, analyze, and interpret material from technical and general fields, and practice reading, writing, listening and speaking skills to gain exposure and functional English on a variety of contemporary topics. The overall course objective is to provide English for Specific Purposes(ESP) instruction to enhance students' reading, writing, listening and speaking skills through a practice in the language. It will aim to build students' confidence and motivation through exposure to academic skills like Note making/taking, Paraphrasing, Summarizing, Report Writing, Making Presentations etc., so as to generate interest in the language from an ESP perspective. Finally, students are expected through the course to gain key strategies and expression for communicating with professionals and non- specialists.

MODULE-1

UNIT-1 **6L+0T+12P+6SL= 24Hours**

EFFECTIVE COMMUNICATION: EXPLORING CHANNELS AND METHODS:

Sub-themes: Types of communication, non-verbal communication, communication strategies and Barriers of communication, digital communication tools.

*IKS- Traditional Communication Methods in Ancient India and the ***Gurukul system*** emphasized face-to-face communication, clarity in speech, and respectful dialogue.

Vocabulary Building: Roots, Prefixes and Suffixes-commonly used 50.

Grammar: Articles and Prepositions.

Reading: Skimming and scanning for information.

Writing: Paragraph Writing, Summarizing.

Listening: Note Making, Note Taking.

Speaking: Introducing One- self.

UNIT- 2

A NEW ERA OF HEALTH CONSCIOUSNESS: IN PURSUIT OF BETTER HEALTH:

Sub-themes: Importance of physical and mental well-being, benefits of healthy lifestyle choices, current health trends.

*IKS- "Traditional Indian Approaches to Health and Well-being"

Vocabulary Building: Homophones and Homonyms (commonly Miss spelt Words).

Grammar: Tenses.

Reading: Reading for specific details – Reasons.

Writing: Process Description.

Listening: Listening for main ideas and supporting details on health topics.

Speaking: Object Description (JAM).

PRACTICES:

- Note making and Note Taking.
- Summarizing.
- Paragraph Writing.
- Reading Comprehension
- Error Correction and Restructuring.
- Vocabulary building.
- Process Description.
- Tenses.

SKILLS:

- ✓ *Apply different sub-skills like skimming, scanning, reading for information, reading for inference etc. to understand different kinds of text.*
- ✓ *Apply different sub skills like top down, bottom up approaches to listening.*
- ✓ *Use functional vocabulary relevant to engineering and technology to express ideas lucidly.*
- ✓ *Use appropriate sentence structure, cohesive devices to construct simple text in regular correspondence like e-mails and letters.*

MODULE-2

UNIT-1 **9L+0T+18P+9SL= 36Hours**

DISRUPTIVE TECHNOLOGIES: ETHICAL IMPLICATIONS AND FUTURE PROSPECTS:

Sub-themes: Introduction to artificial intelligence, machine learning, Augmented and Virtual Realities, AI in different sectors, Colonizing the Space and Cloning, ethical implications of AI, future prospects.

Vocabulary Building: Idioms and Phrases

Grammar: Subject-Verb Agreement

Reading: Reading for Tone, intention and Irony for Global understanding

Writing: Paraphrasing, Letter Writing

Listening: Listening for main ideas

Speaking: JAM

UNIT-2

ENTREPRENEURSHIP AND START-UP CULTURE: EMERGING TRENDS:

Sub-themes: Startup ecosystem, emerging industries, the role of technology in entrepreneurship, global market trends.

Vocabulary Building: Words Confused

Grammar: Active and Passive Voice

Reading: Reading for specific details

Writing: E-mail Etiquette, Data Interpretation, Report Writing

Listening: Note Making from a Long Lecture

Speaking: Group Discussion

UNIT-3

ETHICAL LEADERSHIP: INTEGRATING SOCIAL RESPONSIBILITY AND CORE VALUES:

Sub-themes: Corporate social responsibility (CSR), ethical business practices, environmental responsibility.

Principles of Dharma and Leadership in Ancient Indian Thought

Vocabulary Building: Homo Phones-Spellings (commonly Miss Spelt Words).

Grammar: Synthesis – use of coordinating and subordinating Conjunctions.

Reading: Reading for tone, intention and irony.

Writing: Report Writing, Reviews and Social Media Messaging-Etiquette.

Listening: Listening for main ideas and supporting details on health topics.

Speaking: Team Presentations

PRACTICES:

- E-mail writing.
- Letter writing.
- Paraphrasing
- Report writing.
- Process Description.
- Data Interpretation.
- Messaging in Social media.
- Writing Reviews.
- Group Discussion.

COURSE OUTCOMES:

Upon successful completion of the course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Mapping with POs
1	Apply a variety of strategies to interpret and comprehend spoken texts/discourse using contextual clues.	Apply	6, 7, 8, 9, 10, 11
2	Apply appropriate reading strategies to interpret content / material related to engineering and technology domain.	Apply	6 7, 8, 9, 10, 11
3	Participate in discussions and make short presentations on general and technical topics.	Analyze	6 7, 8, 9, 10, 11
4	Possess an ability to write clearly on topics related to technology and workplace communication.	Evaluate	6 7, 8, 9, 10, 11
5	Choose functional language, grammar structures, cohesive devices and skills of organization to express clearly in speaking.	Create	6, 7, 8, 9, 10, 11

MAPPING OF SUSTAINABLE DEVELOPMENT GOALS (SDGS) AND INDIAN KNOWLEDGE SYSTEM (IKS):

TEXTBOOK:

1. Tabitha Chekuri & Ravi Perimulla, INGENUITY: A Course Book on Technical English Communication, Cengage Learning, 2022.

REFERENCE BOOKS:

1. Balasubramanian T, “A Text book of Phonetics for Indian Students”, Orient Longman, New Delhi, 1989.
2. Krishnaswamy, N and Sriraman, T, “Current English for Colleges”, Trinity publications, 2016.
3. Ashraf Rizvi M, “Effective Technical Communication”, 2nd Edition, McGraw Hill Education, 2017.

22CY101 CYBER SECURITY

Hours Per Week :

L	T	P	SL	C
0	1	1	0	1

PREREQUISITE KNOWLEDGE: Basic familiarity with computers, internet usage, mobile apps, and fundamental digital communication concepts.

COURSE DESCRIPTION AND OBJECTIVES:

This course offers a broad overview of cybersecurity, designed for students from all engineering disciplines. It introduces the basic concepts of security, threats, and preventive practices in the digital world. Students will learn cyber hygiene, common attack vectors, legal and ethical considerations, and safe digital practices applicable to personal and professional environments.

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MODULE-1

UNIT-1 **0L+6T+6P+0SL = 12 Hours**

INTRODUCTION TO CYBERSECURITY:

Cybersecurity: Definition and Goals, Scope and Importance in Modern Society, Threat landscape: Statistics and recent real-life cyber-attacks, Basics of Information Security: Confidentiality, Integrity, and Availability (CIA Triad).

UNIT-2

TYPES OF CYBER ATTACKS:

Malware (Viruses, Worms, Trojans, Ransomware), Phishing, Spoofing, Denial of Service (DoS/DDoS), Man-in-the-middle (MitM), SQL Injection, Zero-day attacks, Social engineering attacks.

MODULE-2

UNIT-1 **0L+9T+9P+0SL = 18 Hours**

CYBER SAFETY AND BEST PRACTICES:

Password protection and Multi-Factor Authentication, Safe browsing habits and email hygiene, Mobile device security, Secure use of social media platforms, Safe use of public Wi-Fi.

UNIT-2

CYBER LAWS AND ETHICS:

Overview of Indian IT Act 2000 & amendments, Digital signature, cyber-crime laws, Data Privacy & GDPR, Cyber ethics & responsible digital behaviour.

UNIT-3

THREATS, ATTACKS, AND VULNERABILITIES:

Online Threat Vectors: Web, Email, USB, Social Media, Introduction to Vulnerabilities and Risk Concepts, Case Studies: Real-world Cyber Attacks.

SKILLS:

- ✓ *Awareness of common cyber threats and online risks.*
- ✓ *Ability to identify phishing, fraud messages, and unsafe links.*
- ✓ *Practice of strong password habits and secure digital behaviour.*
- ✓ *Understanding of real-world cybercrime scenarios.*

PRACTICES:

- Working of phishing emails.
- Secure password creation.
- Browser settings and privacy tools.
- Use of antivirus/firewalls/Two-Factor Authentication (2FA).
- Introduction to tools like Wireshark, Burp Suite demo.
- Cybercrime reporting portal walk-through.

COURSE OUTCOMES:

Upon successful completion of the course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Mapping with POs
1	Understand and apply the fundamentals of cybersecurity and cyber threats.	Apply	1,2,6,8
2	Identify and explain common cyber threats and personal protection techniques.	Apply	1,2,3,4,6
3	Demonstrate safe browsing, secure communication practic-es, and recognize scam patterns.	Apply	2,3,4,6,8
4	Appreciate the role of cybersecurity across different fields and in daily personal use.	Apply	1, 2, 3,5

MAPPING OF SUSTAINABLE DEVELOPMENT GOALS (SDGS):

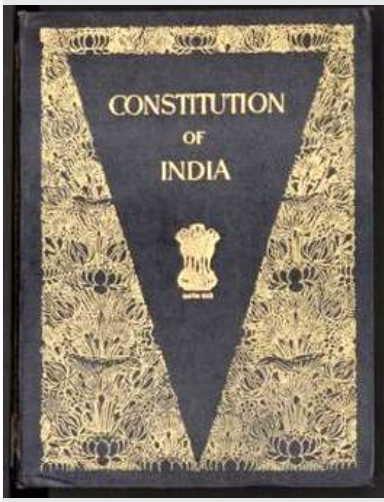
TEXTBOOK:

1. EC-Council, “Cybersecurity Essentials”, Cengage Learning, 2021.

REFERENCE BOOKS:

1. Nina Godbole & Sunit Belpure, “Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives”, Wiley India.
2. James Graham, “Introduction to Cyber-Warfare: A Multidisciplinary Approach”, Syngress.
3. Peter W. Singer & Allan Friedman, “Cybersecurity and Cyberwar: What Everyone Needs to Know”, Oxford University Press.

22SS101 CONSTITUTION OF INDIA



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Hours Per Week :

L	T	P	SL	C
0	2	0	0	1

PREREQUISITE KNOWLEDGE: Nil

COURSE DESCRIPTION AND OBJECTIVES:

This foundational course introduces students to the basic philosophy and functioning of the Indian Constitution. It explores constitutionalism, fundamental rights, duties, directive principles, and the organization of the Indian state. Emphasis is placed on participatory democracy, local self-governance, and ethical foundations using insights from Indian Knowledge Systems (IKS) and alignment with Sustainable Development Goals (SDGs).

MODULE-1

UNIT-1 **0L+12T+0P+0SL=12 Hours**

Historical Background to the Indian Constitution- Meaning of Constitution, Constitutional Law and Constitutionalism- Historical evolution: colonial legacy to the Constituent Assembly- Salient features and values of the Indian Constitution, Rajadharma, Sabha–Samiti traditions of governance, Peace, Justice, and Strong Institutions.

UNIT-2

Fundamental Rights, Duties, Directive Principles, and Amendments-- Right to Equality, Freedom, and Life-- Directive Principles of State Policy- Fundamental Duties: relevance and legal status- Amendment procedure and Basic Structure Doctrine, Dharma & Nyaya principles in ***Manusmriti & Arthashastra,*** Reduced Inequality; Peace, Justice and Strong Institutions.

PRACTICES:

- Skit or role-play on framing the Preamble using Sabha–Samiti models.
- Group discussion: Comparison of Fundamental Duties with Dharma-based duties.
- Poster making: Timeline of Indian Constitutional development.

MODULE - 2

UNIT-1 **0L+18T+0P+0SL=18 Hours**

Structure and Form of Government- Federalism: Centre-State Power Distribution-Parliamentary Form of Government- Emergency Provisions: Sabha advisory traditions; checks and balances.

UNIT-2

Local Self-Government- 73rd and 74th Constitutional Amendments- Panchayats and Municipalities- Participatory democracy and grassroots governance: Gram Sabha, Panchayat Raj in Vedic and Smriti texts: Sustainable Cities and Communities.

UNIT-3

Constitution and Contemporary Citizenship- Importance of the Constitution in everyday life- Digital citizenship and democratic awareness- Rights of marginalized and vulnerable groups- Civic duties, RTI, electoral literacy: Duty-based ethics; community participation traditions- Gender Equality.

SKILLS:

- ✓ *Understand foundational constitutional principles and values.*
- ✓ *Identify and apply rights and duties in every-day civic life.*
- ✓ *Analyze government structure and local governance mechanisms.*

PRACTICES:

- Mock Gram Sabha or Ward Committee meeting.
- RTI Application writing workshop.
- Constitution Quiz based on rights and duties.

COURSE OUTCOMES:

Upon successful completion of the course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Mapping with POs
1	Implement the core principles and features of the Indian Constitution in real- life civic and democratic situations.	Apply	6
2	Dissect the significance of Fundamental Rights, Duties, and Directive Principles in promoting constitutional morality.	Analyze	6,7
3	Differentiate the roles of constitutional institutions and intergovernmental relations in sustaining India's federal framework.	Analyze	6,7
4	Evaluate the performance of the Indian Constitution in upholding democratic values and social justice.	Evaluate	6,7

MAPPING OF SUSTAINABLE DEVELOPMENT GOALS (SDGS) AND INDIAN KNOWLEDGE SYSTEM (IKS):

TEXTBOOK:

1. B.R. Ambedkar – The Constitution of India, Educreation Publishing, 2020.

REFERENCE BOOKS:

1. P.M. Bakshi – The Constitution of India, Universal Law Publishing, 15th Ed.
2. Subhash Kashyap – Our Constitution, National Book Trust, 2011.
3. Arun Thiruvengadam – The Constitution of India: A Contextual Analysis, Hart, 2017.
4. Constituent Assembly Debates – Lok Sabha Secretariat.
5. Arthashastra (Kautilya) – Translations on governance.
6. Manusmriti (Select chapters on duties and justice).

22SA103 PHYSICAL FITNESS

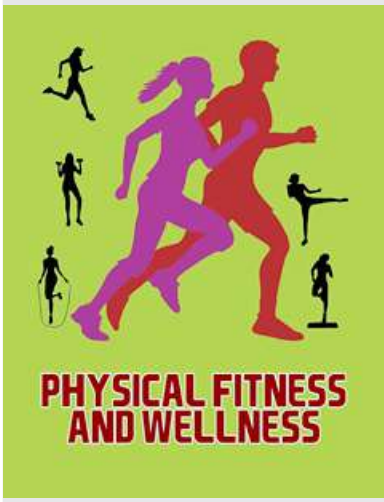
Hours Per Week :

L	T	P	SL	C
0	0	2	0	1

PREREQUISITE KNOWLEDGE: Nil

COURSE DESCRIPTION AND OBJECTIVES:

This course offers students a structured approach to improve their physical fitness and mental wellness using evidence-based exercise science and traditional yogic wisdom. It emphasizes developing strength, endurance, flexibility, and emotional balance, and encourages students to incorporate lifelong wellness habits.



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MODULE-1

UNIT-1 **0L+0T+12P+0SL = 12 Hours**

FUNDAMENTALS OF PHYSICAL FITNESS:

Health-related and skill-related fitness components, Fitness assessment techniques and health screening, Posture and gait analysis.

UNIT-2

ASSOCIATING:

Endurance training methods – HIIT, continuous running, basic circuit training, Strength training using bodyweight and resistance, Importance of core stability and functional fitness, Injury prevention and recovery basics.

PRACTICES:

- Warm-up and mobility exercises, Stretching exercises.
- Running ABC Exercises.
- Speed Training - Short Sprints (30 Meter Run), Shuttle Runs.
- 400 Meters run, 100 Meters run.
- Bodyweight strength circuit (Sit- Ups and Push-Ups).
- Endurance (running/jogging/skipping).
- Static & dynamic stretching.
- Postural correction activities.

MODULE-2

UNIT-1 **0L+0T+18P+0SL = 18 Hours**

FLEXIBILITY, STRENGTH & COORDINATION:

Static and dynamic stretching, Balance drills and neuromuscular coordination, Plyometric and agility ladder exercises, Integration of yoga practices for cool-down.

UNIT-2

NUTRITION, RECOVERY & FITNESS HABITS:

Basics of sports and yogic nutrition, Macronutrients, hydration, meal planning, Role of sleep and active recovery, Fitness myths and self-monitoring.

SKILLS:

- ✓ *Improved strength, endurance, and flexibility.*
- ✓ *Understanding of fitness principles.*
- ✓ *Discipline and goal-setting.*
- ✓ *Teamwork and communication.*

UNIT-3

YOGA PRACTICES FOR WELLBEING:

Asanas (10–15) for flexibility, balance, and spine health, Pranayama: Anulom-Vilom, Bhramari, Kapalabhati, Meditation: Breath focus, Om chanting, Yoga Nidra and relaxation techniques.

PRACTICES:

- Guided Sukshma Vyayam and Asana sequences.
- Meditation.
- Yoga Nidra.
- Nutrition logging.
- Breath-focused mindfulness activities.
- Group Reflections.

COURSE OUTCOMES:

Upon successful completion of the course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Describe the physiological effects of exercise on the body systems.	Apply	1	7,8,9,10,11
2	Apply the FITT (Frequency, Intensity, Time, Type) principle to personal fitness plans.	Apply	1	7,8,9,10,11
3	Assess personal fitness levels through various fitness tests.	Analyze	2	7,8,9,10,11
4	Evaluate progress toward personal fitness goals and make adjustments as needed.	Evaluate	2	7,8,9,10,11
5	Construct a lifestyle plan that integrates regular physical activity for long-term health and fitness.	Create	2	7,8,9,10,11

MAPPING OF SUSTAINABLE DEVELOPMENT GOALS (SDGS) AND INDIAN KNOWLEDGE SYSTEM (IKS):

22SA104 LIFE SKILLS

Hours Per Week :

L	T	P	SL	C
0	0	2	0	1

PREREQUISITE KNOWLEDGE: Nil

COURSE DESCRIPTION AND OBJECTIVES:

This course offers orientation in life skills. Its objective is to acquaint students with the social and inter-personal skills that will enable them to cope with the constantly changing environment. Developing general self-awareness & self-expression.

KUCHIPUDI

MODULE-1

0L+0T+12P+0SL = 12 Hours

Origin of dance according to Natya Shastra, 1-10 Asamyukta hastaalu, 11-20 Asamyukta hastaalu.

MODULE-2

0L+0T+18P+0SL = 18 Hours

21-28 Asamyukta hastaalu, Chaturvidha Abhinayaalu,1-12 Samyukta hastaalu, 13-24 Samyukta hastaalu, Pancha jaatulu, Rasa theory, Classical dance forms of India.

WESTERN DANCE

MODULE-1

0L+0T+12P+0SL = 12 Hours

Basic of Freestyle dancing, Understanding the Rhythm.

MODULE-2

0L+0T+18P+0SL = 18 Hours

Adapting the basic steps to different music's, Assignments – using same choreography routines to different tracks.

CARNATIC MUSIC

MODULE-1

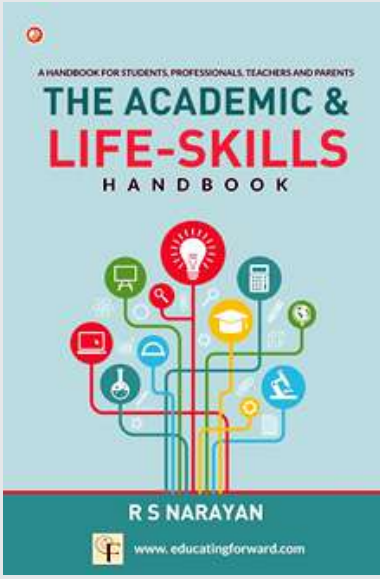
0L+0T+12P+0SL = 12 Hours

Basics of carnatic music, Sarali swarali 3 speeds, Akaara sadhana, Janta swaralu introduction, Importamce of Raag, Taal and about different instruments.

MODULE-2

0L+0T+18P+0SL = 18 Hours

Bhadrachala ramadasu keertanalu, Composing a song, Sing along with karaoke, Popular writers compositions from different languages, Students should do project about music and a famous person related to music.



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SKILLS:

- ✓ *Bouncing back from setbacks and adversity.*
- ✓ *Thinking outside the box to generate new ideas.*
- ✓ *Discipline and goal-setting.*
- ✓ *Teamwork and communication.*

PUBLIC SPEAKING

MODULE-1

0L+0T+12P+0SL = 12 Hours

Introduction to Public Speaking, Informative Speaking, Listening Effectively.

MODULE-2

0L+0T+18P+0SL = 18 Hours

Organizing and Outlining, Delivering Your Speech, Introductions and Conclusions, Critical Thinking and Reasoning.

PAINTING

MODULE-1

0L+0T+12P+0SL = 12 Hours

Free hand outlines drawing on the basis of creativity, originality and individuality.

MODULE-2

0L+0T+18P+0SL = 18 Hours

Memory drawings on various topics like games, festivals, animal study and daily life of society, Still Life with light and shade, Nature study like Landscape, waterfall and Forests etc.

YOGA

MODULE-1

0L+0T+12P+0SL = 12 Hours

Introduction to Yoga, Introduction to Yogasana Sports, Brief History of Yoga, Types, schools of Yoga, Sun salutations Variations.

MODULE-2

0L+0T+18P+0SL = 18 Hours

Yoga for Stress, Introduction to Astanga Yoga, Introduction to classical texts of Yoga, Yogic Diet, Yoga Nidra, Introduction to Meditation, Yoga for Sports, Injury Management with Yoga, Introduction to Yoga therapy, Yoga for weight loss, Diabetes.

COOKERY

MODULE-1

0L+0T+12P+0SL = 12 Hours

Preparation of Bread Halwa, Flavoured Milk, Veggie soups, Herbal Tea.

MODULE-2

0L+0T+18P+0SL = 18 Hours

Fritters, Rasagulla, Onion Samosa, Soya Nuggets, Dhokla, Cutlet.

VIDEO EDITING

MODULE-1

0L+0T+12P+0SL = 12 Hours

Necessity & Principles of Editing, Editing for the genre, Film Appreciation, Digital Filmmaking.

MODULE-2

0L+0T+18P+0SL = 18 Hours

Post Production Tools, Film Editing Styles, Audio Editing and Production, Enhancing Video with Color Grading, Advanced editing techniques, Motion Graphics & Video Editing Portfolio Development.

GERMAN

MODULE-1

0L+0T+12P+0SL = 12 Hours

Alphabet, numbers, greetings, geschwister.

MODULE-2

0L+0T+18P+0SL = 18 Hours

Familie,wo wohnen sie, nachbharn von familie wiegel, inline skaten, wetter, fernsehen, Hobbies.

FRENCH

MODULE-1

0L+0T+12P+0SL = 12 Hours

Pour saluer, Les jours de la semaine, Les mois de l' année.

MODULE-2

0L+0T+18P+0SL = 18 Hours

Les nombres, Décrire l'heure, Les verbes être,avoir et aller, Les nationalités, Les professions, Les fruits et les legumes, Les adjectifs pour décrire une person.

PHOTOGRAPHY

MODULE-1

0L+0T+12P+0SL = 12 Hours

Introduction to Photography, Photography Evolution, Different types of Nature lights.

MODULE-2

0L+-0T+18P+0SL = 18 Hours

DSLR Parts and Types of DSLR's, Anatomy of Camera and Lenses, Types of Lenses, Photo framing, Image resolution, Exposure triangle.

APSSDC ELECTRICAL HOME

MODULE-1

0L+0T+12P+0SL = 12 Hours

Understanding and testing of live switch boards, DB distribution boards, Staircase wiring, complete wiring of 1 BHK, 2 BHK.

MODULE-2

0L+0T+18P+0SL = 18 Hours

Erection and maintenance of fan & tube light, Understanding the protection devices,20 Minutes timer, LDR with timer control, Impulse relay.

APSSDC ELECTRONICS HOME

MODULE-1

0L+0T+12P+0SL = 12 Hours

Understanding of series and parallel connection of bulbs.

MODULE-2

0L+0T+18P+0SL = 18 Hours

Working of ceiling fan, tubelight, mixer grinder, iron box.

BLOCK PRINTING

MODULE-1

0L+0T+12P+0SL = 12 Hours

Introduction to Kalamkari Painting, Tools and Materials for Kalamkari.

MODULE-2

0L+0T+18P+0SL = 18 Hours

Basic Techniques and Sketching for Kalamkari, Dyeing Techniques for Kalamkari Introduction to Block Printing, Block Printing Techniques and Final Projects.

HANDCRAFTS

MODULE-1

0L+0T+12P+0SL = 12 Hours

Plastic bottle with Shilpkar work, Paper craft for room decoration, Wall hanging with ice cream sticks.

MODULE-2

0L+0T+18P+0SL = 18 Hours

Table stand with cotton buds, 3D outline with bottle decoration, Thermocol work.

SELF DEFENSE BY TAEKWONDO

MODULE-1

0L+0T+12P+0SL = 12 Hours

Self Defense by Taekwondo- Side Wrist Grip Escape and Cross Wrist Grip escape, Side Wrist Grip - Arm Bar, Wrist Lock, Shoulder Lock.

MODULE-2

0L+0T+18P+0SL = 18 Hours

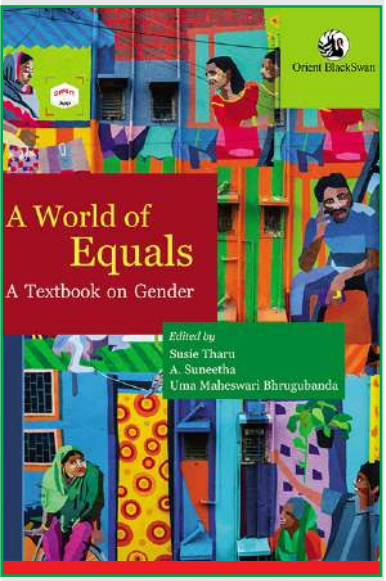
Double Wrist Grip Escape, Upper Double Grip Escape, Major Outer Reaping Throw, Major Hip Throw, One Arm Shoulder Throw.

COURSE OUTCOMES:

Upon successful completion of the course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Demonstrate proficiency in a variety of techniques	Apply	1	7,8,9,10,11
2	Identify, demonstrate and understand the structures and characteristics	Apply	1	7,8,9,10,11
3	Cultivate concentration, self-control, and emotional regulation.	Analyze	2	7,8,9,10,11
4	Demonstrate increased confidence and the ability to respond assertively and calmly in threatening situations.	Evaluate	2	7,8,9,10,11
5	Understand and apply sustainable and ethical practices.	Create	2	7,8,9,10,11

MAPPING OF SUSTAINABLE DEVELOPMENT GOALS (SDGS):



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22SA102 SELF-UNDERSTANDING AND GENDER SENSITIZATION

Hours Per Week

L	T	P	SL	C
0	0	2	0	1

PREREQUISITE KNOWLEDGE: Nil

COURSE DESCRIPTION AND OBJECTIVES:

To comprehend the dynamics of gender roles and relations within social and cultural contexts, and to evaluate legal and behavioral frameworks that promote gender equality and personal growth.

MODULE-1

0L+0T+12P+0SL=12 Hours

UNIT-1

UNDERSTANDING GENDER:

Concept of Gender: Distinction between Gender and Sex - Socialization and Gender Roles - Gender and Culture: Stereotypes and Social Conditioning - Gender-Based Violence: Forms, Impact and Prevention. ***Shakti philosophy, contributions of women in Vedas.***

Activity-Based Learning: Group discussions on gender roles in media - Role plays on gender stereotyping - Case study analysis of real-life incidents of gender-based violence

UNIT-2

GENDER LAWS AND RIGHTS:

Gender and Labour: Equal Pay, Workplace Harassment, Maternity Benefits - Legal and Constitutional Provisions for Gender Equality in India: Article 14, 15, 16, 39, and 42, POSH Act, Domestic Violence Act, Dowry Prohibition Act - Women's Rights and Human Rights Framework. ***Dharma-based equality, Sarvodaya philosophy.***

Activity-Based Learning: Legal case study presentations -Debate on gender justice and law implementation - Quiz on gender-related legal provisions

PRACTICES:

- Conduct a survey on gender roles and relations in the banking and IT sectors to assess employee attitudes and resistance to policy changes.
- Undertake a study to identify the impact of cultural perceptions on gender-based violence and its effects on workplace productivity.
- Analyze the characteristics and components of gender laws to evaluate their effectiveness in promoting labor rights and reducing gender discrimination.
- Perform a study on the determinants of gender roles and culture by reviewing media content and social norms to understand their influence on attitudes.
- Conduct a comparative analysis of constitutional and legal perspectives on gender equality to assess their impact on labor practices and gender sensitivity in various industries.

MODULE-2

0L+0T+18P+0SL=18 Hours

UNIT-1

SELF –EMPOWERMENT:

Self-awareness and Self-confidence -Building Personal Identity -Values and Ethics for Personal Growth - Goal Setting and Motivation.

Activity-Based Learning: Self-reflection journals - Vision board creation - Group sharing sessions

SKILLS:

- ✓ *Self Esteem Skills.*
- ✓ *Decision Making Skills.*
- ✓ *Problem Solving Skills.*
- ✓ *Team Building Skills.*
- ✓ *Interpersonal Skills.*
- ✓ *Leadership Skills.*

UNIT-2

PERSONALITY DEVELOPMENT SKILLS:

Types of Personality: Introvert, Extrovert, Ambivert - Good Manners and Professional Etiquette - Developing a Positive Attitude.

Activity-Based Learning: Role plays on etiquette, Personality-type assessment and group analysis, Positivity circles

UNIT-3

LIFE MANAGEMENT SKILLS:

Decision Making and Problem Solving - Interpersonal Communication Skills - Time and Stress Management - Conflict Resolution and Leadership.

Activity-Based Learning: Situational games for decision making, Time log and stress diary activity, Group project on conflict resolution strategies

PRACTICES:

- Survey on different personality types and their impact on workplace performance and team dynamics.
- Undertake a study on the effectiveness of etiquette training programs in improving professional interactions and workplace relationships.
- Analyze strategies for developing a positive attitude and their impact on employee engagement and job satisfaction.
- Conduct a study on time management practices and their influence on productivity and work-life balance.
- Perform a study on conflict management techniques and their effectiveness in resolving workplace disputes and improving team cohesion.

COURSE OUTCOMES:

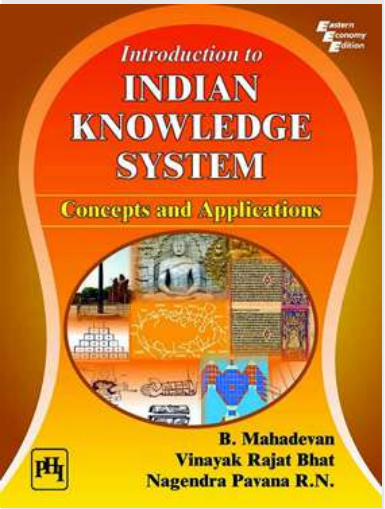
Upon successful completion of this course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Mapping with POs
1	Analyze the influence of gender roles and cultural norms on individual behavior and social structures.	Analyze	6
2	Apply legal perspectives and gender laws to assess their impact on gender equality and labor rights.	Apply	6
3	Analyze various personality types and develop Strategies to apply good manners and etiquette in diverse settings.	Analyze	6
4	Apply decision-making and time management skills to enhance personal and professional effectiveness.	Apply	6
5	Analyze conflict management and leadership skills to effectively handle interpersonal and organizational Challenges.	Analyze	6

MAPPING OF SUSTAINABLE DEVELOPMENT GOALS (SDGs) AND INDIAN KNOWLEDGE SYSTEM (IKS) :

REFERENCE BOOKS:

1. A World of Equals: A Textbook on Gender, Susie Tharu, Uma Maheswari Bhrugubanda (2022), Orient Blackswan Pvt. Limited.
2. Chitra Chellam (2022), Personality Development, Sara Book Publication.



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22SS102 INDIAN KNOWLEDGE SYSTEMS

Hours Per Week :

L	T	P	SL	C
0	2	0	0	1

PREREQUISITE KNOWLEDGE: High School – level knowledge on Indian history and society.

COURSE DESCRIPTION AND OBJECTIVES:
The course introduces students to India's rich and diverse knowledge traditions and heritage. The profound insights, timeless wisdom, and diverse perspectives, originating from the ancient past have played a major role in shaping the country's cultural identity. The richness of India's intellectual heritage is vindicated by the existence of innumerable texts and thinkers in the country. By exploring India's knowledge traditions, the course aims to help students learn how the country's culture developed across the ages and to enable them look beyond conventional methods in finding solutions to scientific and technological issues.

MODULE-1

UNIT-1 **0L+12T+0P+0SL = 12 Hours**

INTRODUCTION TO INDIAN KNOWLEDGE SYSTEMS:
Definition, Scope, and Significance of IKS; Various Fields of Study in IKS (Science, Medicine, Arts, Linguistics, Philosophy, etc.); Key Texts and Sources of information for IKS: Vedic, Buddhist, Jain, and Other Traditions.

UNIT-2

PHILOSOPHICAL AND SCIENTIFIC FOUNDATIONS OF IKS:
Overview of Major Schools of Thought (Nyaya, Samkhya, Vedanta, etc.); Early Scientific and Technological Contributions (Mathematics, Astronomy, Medicine); Centers of Learning: Nalanda, Takshashila, and Others.

PRACTICES:

- Mapping IKS Disciplines – Create a chart or mind map showcasing various fields of study in IKS, including Science, Medicine, Arts, and Philosophy.
- Textual Exploration – Select and summarize insights from classical IKS texts (Vedas, Upanishads, Buddhist & Jain texts).
- IKS in Daily News – Collect newspaper articles on IKS-related discoveries (archaeological findings, indigenous technologies, art forms) and discuss their relevance.
- Field Visit/Virtual Tour – Explore ancient centers of learning like Nalanda and Takshashila (via museum visits, documentaries).
- Poster Display of Philosophers – Create visual profiles of prominent ancient philosophers (e.g., Charaka, Sushruta, Panini, Aryabhata).

MODULE-2

UNIT-1 **0L+18T+0P+0SL = 18 Hours**

DISCIPLINE-SPECIFIC INDIAN KNOWLEDGE SYSTEMS:
Role of IKS within the discipline (Science, Technology, or Law); Key Concepts and Applications within the discipline; Demonstration of IKS via real-life examples (Traditional Art, Architecture, and Indigenous Engineering Practices).

UNIT-2

RELEVANCE OF IKS IN THE MODERN WORLD:
Contributions of IKS to Global Knowledge Systems; Revival and Integration of IKS with Contemporary Science and Technology; Challenges and Opportunities in Preserving IKS.

UNIT-3

IKS AND SUSTAINABLE PRACTICES:
Indigenous Knowledge in Agriculture, Water Management, and Medicine; Environmental Ethics in Ancient Indian Traditions; Case Studies on Sustainable Development Using IKS.

PRACTICES:

- Discipline-Specific IKS Study – Research and present how IKS applies to law, governance, science, architecture, or technology.
- Exploring Indigenous Techniques – Engage in practical demonstrations of traditional knowledge such as Yoga, Meditation, Martial Arts (Karra Saamu), or Body Art.
- IKS Documentation Project – Collect and document indigenous knowledge traditions, such as traditional medicine, water harvesting, or agriculture.
- Awareness on Intellectual Property Risks – Use the internet to study indigenous intellectual properties that are at risk of international appropriation.
- Group Discussion on Challenges to IKS – Debate the modern relevance and challenges in preserving IKS, and propose solutions for its integration into science and technology.

COURSE OUTCOMES:
Upon successful completion of the course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Mapping with POs
1	Apply basic concepts of Indian Knowledge Systems to recognize their relevance in contemporary science, engineering, and society.	Apply	6, 11
2	Analyze selected indigenous practices in areas such as health, environment, water management, or architecture to understand their principles.	Analyze	6, 8, 9, 11
3	Evaluate the ethical and ecological values embedded in IKS and their relevance to sustainability and social responsibility.	Evaluate	6, 7
4	Develop an informed understanding of Indian Knowledge Systems by applying them in reflections, discussions, or illustrative examples.	Apply	6, 8, 9, 11

MAPPING OF SUSTAINABLE DEVELOPMENT GOALS (SDGS) AND INDIAN KNOWLEDGE SYSTEM (IKS):

TEXTBOOKS:

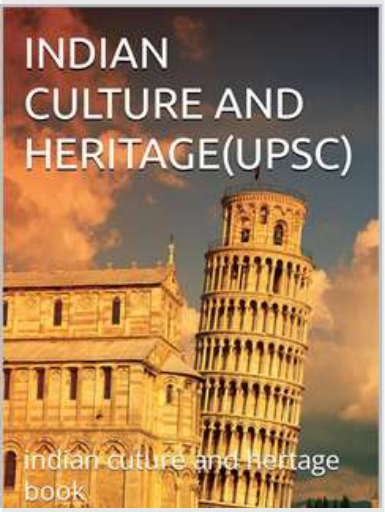
1. B. Mahadevan, Vinayak Rajat Bhat, Nagendra Pavana R. N., Introduction to Indian Knowledge System: Concepts and Applications, PHI Learning Private Limited, Delhi, 2023.
2. Mukul Chandra Bora, Foundations of Bharatiya Knowledge System, Khanna Book Publishing, 2023.

REFERENCE BOOKS:

1. Dhirendranath Banerjee and Sanjit Kumar Sadhukan (ed.), Ancient Indian Scientific Thought and Modern Theories: An Overview, National Mission for Manuscripts and D. K. Printworld, 2019.
2. Shaik Taufiq Khalil, Indian Knowledge System: Arthshastra by Kautilya, Notion Press, 2023.
3. Chauhan Bhag Chand, IKS: The Knowledge System of Bharata, Garuda Prakashan, 2023.

SKILLS:

- ✓ *Ability to analyze and evaluate Indian Knowledge System (IKS) practices in the context of modern challenges.*
- ✓ *Problem-solving skills through the application of IKS principles to contemporary issues.*
- ✓ *Strong research skills in gathering and analyzing information related to IKS.*
- ✓ *Collaborative skills for preserving and promoting IKS.*
- ✓ *Enthusiasm for learning and practicing traditional skills such as weaving, pottery, and herbal medicine.*



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22SS103 INDIAN CULTURE AND HERITAGE

Hours Per Week :

L	T	P	SL	C
0	2	0	0	1

PREREQUISITE KNOWLEDGE: Basic understanding of Indian history and culture at the high school level.

COURSE DESCRIPTION AND OBJECTIVES:

This course introduces students to the foundational concepts, expressions, and institutions of Indian culture and heritage. Students will explore the richness of India's tangible and intangible legacies-its philosophies, arts, knowledge systems, and monuments-while engaging with key values like unity in diversity, sustainability, and respect for tradition. The course emphasizes civic responsibility, heritage preservation, and the contemporary relevance of India's cultural identity.

MODULE-1

UNIT-1 **0L + 12T + 0P + 0SL = 12 Hours**

CULTURE AND HERITAGE – MEANINGS AND DIMENSIONS:

Definitions: Culture and Heritage; Distinction between tangible and intangible heritage; Core features of Indian culture (Sanskriti): unity in diversity, continuity, and pluralism; Role of heritage in shaping identity and nation-building.

UNIT-2

HISTORICAL ROOTS OF HERITAGE:

Harappan Civilization and its heritage: city planning, trade, and script; ***Vedic culture*** and religious texts as cultural heritage; Cultural impact of Buddhism and Jainism; Bhakti and Sufi traditions as living intangible heritage; Local traditions and oral culture across regions.

PRACTICES:

- Comparative poster/chart on tangible vs intangible heritage.
- Case study presentation: a local or regional tradition.
- Group presentation on an ancient site recognized by UNESCO.
- Write a short essay: "Why preserve heritage in the digital age?"

MODULE-2

UNIT-1 **0L + 18T + 0P + 0SL = 18 Hours**

TANGIBLE HERITAGE – ART, ARCHITECTURE, AND MONUMENTS:

Architectural diversity: Temples, Mosques, Churches, Stupas, Forts, Palaces, and Rock-cut caves; Notable heritage sites: Hampi, Qutub Minar, Taj Mahal, Konark, Charminar, Lepakshi Temple, Amaravati Stupa, and Victoria Memorial; Conservation challenges: environmental threats, pollution, neglect, urbanization, and insensitive tourism; Role of ASI and UNESCO World Heritage recognition.

UNIT-2

INTANGIBLE HERITAGE – KNOWLEDGE, FESTIVALS, AND VALUES:

Indian classical music and dance as living heritage; Traditional systems: Ayurveda, Yoga, and traditional ecological knowledge; Community-based practices: folk traditions and seasonal festivals; Core cultural values: non-violence, nature worship, family systems, and community life.

UNIT-3

HERITAGE PRESERVATION IN MODERN INDIA:

Heritage sense during the freedom struggle (e.g., revival of Khadi, Swadeshi art); National institutions preserving heritage: IGNCA, INTACH, and ASI; Digital documentation and cultural mapping initiatives; Youth and civic responsibility in heritage conservation.

PRACTICES:

- Virtual tour/report on a heritage site.
- Storyboarding: heritage in daily life.
- Role-play or debate: "Heritage vs. Modernity – Finding the Balance."
- Case studies of successful community preservation efforts.

COURSE OUTCOMES:

Upon successful completion of the course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Mapping with POs
1	Apply key concepts of Indian culture and heritage to appreciate its role in shaping societal values and identity.	Apply	6, 11
2	Analyze the evolution and characteristics of India's tangible and intangible heritage across regions and time.	Analyze	5, 6, 8
3	Evaluate contemporary challenges and strategies in preserving heritage through institutional and civic efforts.	Evaluate	6, 7, 8
4	Evaluate how cultural values can inform ethical decision-making, sustainability practices, and inclusive societal participation.	Evaluate	6, 7, 8

MAPPING OF SUSTAINABLE DEVELOPMENT GOALS (SDGS) AND INDIAN KNOWLEDGE SYSTEM (IKS):

TEXTBOOKS:

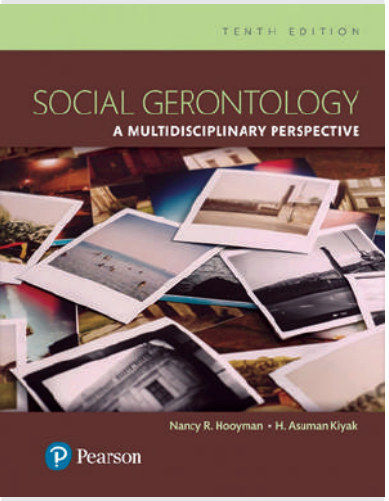
1. B. B. Satpathy, Indian Culture and Heritage, DDCE, Utkal University, 2015.
2. NIOS Course Material: Indian Culture and Heritage (223).
3. A.L. Basham, The Wonder That Was India, Vol.1, Rupa Publications, 1954.

REFERENCE BOOKS:

1. S. Radhakrishnan, Indian Philosophy: Volume I, 2nd ed., Oxford University Press India, 2008
2. Romila Thapar, The Penguin History of Early India: From the Origins to AD 1300, Penguin Books India, 2003.
3. John Keay, India: A History-Revised and Updated, Harper Collins, 2012.
4. Michel Danino, The Lost River; On the Trail of the Sarasvatī, Penguin Books India, 2010.

SKILLS:

- ✓ *Cultural awareness and ethical reasoning.*
- ✓ *Visual, analytical, and storytelling skills.*
- ✓ *Heritage appreciation and preservation thinking.*
- ✓ *Inclusive and civic-minded citizenship.*



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22SS105 GERONTOLOGY

Hours Per Week :

L	T	P	SL	C
0	2	0	0	1

PREREQUISITE KNOWLEDGE: Basic understanding of Indian society, family structure, and human development from middle school social studies.

COURSE DESCRIPTION AND OBJECTIVES:

This course provides an introduction to gerontology - the study of aging. This course helps students explore what it means to grow old in India, the role of the elderly in Indian families and society, and how we can care for and support older adults. It aims to help students understand the complexities of aging, challenge common stereotypes, and appreciate the diversity of the older adult population in India. Students will learn about real-life challenges faced by older people and ways to build a more inclusive, respectful society.

MODULE-1

UNIT-1 **0L+12T+0P+0SL = 12 Hours**

UNDERSTANDING AGING: BIOLOGICAL AND PSYCHOLOGICAL PERSPECTIVES:

Defining Gerontology: Introduction to the field, and its importance, with a note on the demographic shift in India; Theories of Aging: Biological theories (e.g., cellular clock theory, free radical theory) and psychological theories (e.g., Erikson's stages of psychosocial development, activity theory) and their applicability in the Indian context; Physiological Changes with Age: Common changes in body systems (e.g., cardiovascular, musculoskeletal, nervous) and common health challenges faced by older adults in India; Cognitive Changes with Age: Memory, attention, problem-solving, and the concept of cognitive reserve, with a focus on cognitive health in the Indian population; Mental Health in Later Life: Common challenges (e.g., depression, anxiety) and promoting well-being, considering cultural factors influencing mental health in older Indians.

UNIT-2

SOCIAL ASPECTS OF AGING AND DIVERSE EXPERIENCES IN INDIA:

Social Theories of Aging: Disengagement theory, continuity theory, socioemotional selectivity theory, and their relevance to Indian societal structures; Ageism and Stereotypes: Understanding prejudice and discrimination against older adults in India, challenging negative perceptions and cultural notions of aging; Family and Social Relationships: Role of the joint family system, nuclear families, friendships, and community networks in later life in India; Diversity in Aging in India: Exploring differences based on gender, rural/urban divide, socioeconomic status, religion, and regional variations in experiences of aging; Work, Retirement, and Leisure: Transitions in later life, challenges of formal and informal employment in old age, and the importance of meaningful engagement and traditional leisure activities.

PRACTICES:

- Create a "Grandparent Appreciation Poster" with stories or photos.
- Class discussion on respecting older people.
- Interview a grandparent or senior neighbour and share their experiences.

- Group discussions on common stereotypes about older adults in India and how to challenge them.

MODULE-2

UNIT-1 **0L+18T+0P+0SL=18 Hours**

HEALTH, WELLNESS, AND CARE IN LATER LIFE IN INDIA:

Promoting Healthy Aging: Lifestyle factors (nutrition, traditional diets, yoga, exercise), preventive care and traditional Indian health practices (e.g., Ayurveda); Common Health Conditions: Chronic diseases (e.g., arthritis, diabetes, heart disease) prevalent in India and their management, including access to healthcare; Healthcare Systems for Older Adults in India: Public and private healthcare, challenges of access and affordability, role of family caregivers, and emerging long-term care options; Palliative and End-of-Life Care: Understanding hospice, advance directives, and grief in the Indian cultural context; Technology and Aging: Assistive technologies, telehealth, and their role in supporting older adults in India, considering digital literacy and access.

UNIT-2

AGING IN INDIAN SOCIETY: POLICIES AND COMMUNITY SUPPORT:

Aging-in-Place and Age-Friendly Communities: Concepts and practical applications in Indian cities and villages; Social Policies and Programs for Older Adults in India: National Policy on Older Persons, Maintenance and Welfare of Parents and Senior Citizens Act, government schemes and initiatives; Intergenerational Relationships: Benefits of connecting different age groups, role of grandparents, and promoting intergenerational harmony in India; Ethical Considerations in Gerontology in India: Autonomy, informed consent, elder abuse prevention, and legal protections for older adults; Global Aging: Demographic trends and challenges worldwide, with a specific focus on India's rapidly aging population and its implications.

UNIT-3

INDIAN HERITAGE AND CULTURE IN AGING:

Culture and Civilization: Key characteristics of Indian culture and their influence on perceptions and experiences of aging; Visual Arts: Architecture, Sculpture, and UNESCO Heritage Sites as reflections of historical attitudes towards elders and their contributions; Performing Arts: Classical Music, Dance, and Literature as expressions of wisdom, tradition, and the life cycle in India; Traditional Wisdom and Aging: Exploring concepts like ***"vanaprastha"*** and the reverence for elders in Indian philosophy and texts; Role of Spirituality and Religion: Impact of spiritual and religious practices on well-being in later life in India.

PRACTICES:

- Research on age-friendly initiatives in Indian communities.
- Debate on the ethical considerations surrounding emerging technologies in aging, particularly for the Indian demographic.
- Analysis of how Indian cultural heritage reflects and influences the concept of aging.
- Visit to a local elder care centre or old age home.
- Make a "Healthy Aging Tips" chart.
- Skit or role play on how to care for elders at home or in public.

SKILLS:

- ✓ *Awareness of elderly rights and welfare mechanisms.*
- ✓ *Respect for cultural values and traditions towards elderly in India.*
- ✓ *Critical analysis of aging theories, stereotypes, demographic trends and policies with in Indian context.*
- ✓ *Understanding the diverse needs of older adults in India and societal responses.*
- ✓ *Interpretation of research data related to aging populations in India.*
- ✓ *Designing community-oriented aging interventions.*

COURSE OUTCOMES:

Upon successful completion of the course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Mapping with POs
1	Understand and apply core concepts and theories of gerontology.	Apply	6, 7, 8, 9
2	Analyze the social determinants of aging and the diverse experiences of older adults in India.	Analyze	6, 7, 8, 9
3	Evaluate the healthcare needs and policy frameworks relevant to older adults in India.	Evaluate	6, 7, 8, 9
4	Design and assess community-based solutions for elder care.	Create	6, 7, 8, 9

MAPPING OF SUSTAINABLE DEVELOPMENT GOALS (SDGS) AND INDIAN KNOWLEDGE SYSTEM (IKS):

TEXTBOOKS:

1. Hooyman, N. R., & Kiyak, H. A., Social Gerontology: A Multidisciplinary Perspective. Pearson, 2018.
2. Quadagno, J., Aging and the Life Course: An Introduction to Social Gerontology. McGraw-Hill Education, 2017.

REFERENCE BOOKS:

1. Irudaya Rajan, S., India's Elderly: Burden or Asset? Routledge, 2016.
2. Prakash, I. J., Aging in India: A Sociological Perspective. Rawat Publications, 2009.
3. Kumar, A., Elderly in India: A Socio-Economic Profile. Serials Publications, 2011.
4. Moody, H. R., & Sasser, B. R., Aging: Concepts and Controversies. Sage Publications, 2018.
5. Paltasingh, Tattwamasi, & Tyagi, Renu, Caring for the Elderly: Social Gerontology in the Indian Context. Sage Publications, 2015.
6. Victor, Christina R., The Social Context of Aging: A Textbook of Gerontology. Routledge, 2005.

22ME102 DO IT YOURSELF

Hours Per Week :

L	T	P	SL	C
0	0	2	0	1

PREREQUISITE KNOWLEDGE: Nil

COURSE DESCRIPTION AND OBJECTIVES:

This course is to empower the learners with hands-on experience in designing, fabricating, and testing small-scale engineering systems or components The course objective is to emphasize creativity, innovation, and real-world problem solving through “learning by doing.”

MODULE-1

0L+0T+12P+0SL = 12 Hours

FUNDAMENTALS OF CARPENTRY AND PLUMBING

UNIT-1

CARPENTRY:

Introduction to carpentry tools, use of tools for making simple objects like wooden shelf, picture frame, planters box, coat rack, floating shelves. Ś***ilpa*** Śā***stra (Woodwork & Craftsmanship)***

UNIT-2

PLUMBING:

Introduction to Plumbing tools, use of tools for making simple objects like fitting of taps, faucets, shower heads, replacement of washers in taps, simple pipe joints, few installations

PRACTICES:

- Design and construct a stable and functional 3-tier bookshelf made from plywood or reclaimed wood using dowel joints and varnished for finish using measuring tape, saw, chisel, drill, wood glue.
- Construct a portable and sturdy 3-legged stool made of teak or pine with dowel or mortise joints using Mallet, wood rasp, chisel, clamps.
- Fabricate a safe and user-friendly wooden organizer for books with crate-style bins fixed on a frame with rounded corners for safety using sandpaper, saw, wood router
- Craft a custom wall art panel or divider using CNC-routed or hand-carved geometric or nature-themed panels using CNC router or jigsaw, sander, varnish.
- Make a small desktop stand with precision-cut grooves for gadgets and accessories to hold mobile phones, pens, and sticky note using Coping saw, file, drill press.
- Replace a worn-out rubber washer inside a leaking compression tap using adjustable spanner, flat-head screwdriver, replacement washer, PTFE tape.
- Install a downpipe from the terrace with filtration and diversion to a recharge well using PVC downpipes, filter mesh, first-flush diverter, underground pipe, stones.
- Install a new wall-mounted faucet to replace a broken head, using standard plumbing fittings, pipe wrench, adjustable spanner, pipe sealant tape.
- Plan and install a PVC-based water line with two tap outlets and one washing machine point using T- and elbow joints using PVC cutter, solvent cement, marker, sandpaper.
- Install outlet piping from a 500L overhead water tank to supply a bathroom, kitchen, and garden tap using gravity flow using HDPE pipes, ball valves, elbows, thread tape, support brackets.

SKILLS:

- ✓ *Accurate measuring, marking, and cutting of wood.*
- ✓ *Identification and use of plumbing tools and fittings.*
- ✓ *Operating FDM 3D printers.*
- ✓ *Safe handling of electrical tools and live circuits.*
- ✓ *Disassembly and reassembly of small appliances.*

MODULE-2

0L+0T+18P+0SL = 18 hours

DIY JOBS RELATED TO ADVANCED APPLICATIONS

UNIT-1

3D PRINTING:

Introduction to the concept of FDM – 3D printing, printing of objects like spoon, mobile stand, pen holder, key chain

UNIT-2

HOME APPLIANCES:

Introduction to tools used in assembling/repairing home appliances, assembling of ceiling fan, change of capacitor of fan, checking of faulty winding in electrical appliances, Preventive Maintenance of a Split AC System

.UNIT-3

HOUSE WIRING:

Introduction to tools used in house wiring, fixing of tube light, fan, checking and repairing of a faulty fuse, fixing of a faulty switch/socket,

PRACTICES:

- List the steps you would follow to set up the printer, calibrate the build plate, and load the filament. What safety precautions should you take when handling the 3D printer?
- You need to print a simple personalized keychain with your initials using a 3D printer.
- You want to print a simple carabiner hook that will be used for carrying tools or equipment.
- You want to create a small, functional lock mechanism using 3D printing.
- You need to create a functional smartphone stand to hold your phone at an angle for watching videos or video calls.
- You have purchased a ceiling fan and wish to assemble and install it without professional help. List the sequence of steps you would follow to safely assemble and install the fan. What safety precautions must you take before beginning the installation?
- Your refrigerator seems to be cooling less effectively than usual. What simple checks and maintenance tasks can you perform yourself before calling a technician? Include cleaning, defrosting, and ventilation considerations.
- You have bought a new flat-screen TV and wall mount. What are the steps to assemble and mount it safely? What precautions must be taken regarding wire management and socket access?
- A tube light in your kitchen is flickering continuously and eventually stops working. After replacing the tube and starter, the issue persists. Describe the steps you would take to identify and fix the problem. What are the possible faulty components? How would you confirm if the ballast needs replacement?
- A room in your house loses power suddenly while other areas are unaffected. You suspect a blown fuse. How would you confirm this? Explain how to safely check and replace the fuse. What precautions should be taken to avoid future fuse failures?
- A wall switch that controls your living room light is no longer working — the light does not turn on even after changing the bulb. How would you go about checking the switch? What steps would you follow to replace it yourself, and how would you ensure it's safe to operate afterward?
- A socket in your bedroom is loose and occasionally sparks when plugging in devices. What are the risks involved, and how would you inspect and repair the socket? What are the signs that the socket needs replacement versus just re-tightening the connections?

COURSE OUTCOMES:

Upon successful completion of the course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Mapping with POs
1	Apply basic carpentry techniques to measure, cut, shape, and assemble wooden components using hand and power tools	Apply	1,5,6,7,10
2	Demonstrate the ability to install, maintain, and troubleshoot common residential plumbing systems	Apply	1,5,6,7,11
3	Design and fabricate functional 3D models using slicing software and additive manufacturing techniques	Create	1,5,10,11
4	Inspect, diagnose, and repair common faults in household appliances	Analyze	1,4,6
5	Construct safe and functional single-phase electrical wiring circuits for lighting, switching, and plug points	Evaluate	1,2,6,11

MAPPING OF SUSTAINABLE DEVELOPMENT GOALS (SDGS) AND INDIAN KNOWLEDGE SYSTEM (IKS):

TEXTBOOK:

1. “Basic Electrical Installation Work” by Trevor Linsley.

REFERENCE BOOKS:

1. “3D Printing and Additive Manufacturing: Principles and Applications” by Chee Kai Chua & Kah Fai Leong.
2. “Ultimate Guide: Plumbing” by Merle Henkenius
3. “Carpentry Complete” by Andy Engel.