ST. VINCENT PALLOTTI COLLEGE OF ENGINEERING & TECHNOLOGY, NAGPUR

(An autonomous institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

B. Tech. Scheme of Examination & Syllabus 2025-26

INDUSTRIAL IoT

SEMESTER II

Sr No	Course Category	Course Code	Course Title	Hours per Week			Credits	Maximum Marks				Minimum Passing Marks	No. of Hrs for ESE
				L	T	P		Mid-Sem Examination	Continual Assessment	End Sem Examination	Total		
1.	BSC	25II201T	Applied Chemistry	2	-	-	2	10	10	30	50	23	1.5
2.	BSC	25II201P	Applied Chemistry Lab	-	-	2	1	-	25	25	50	25	-
3.	BSC	25II202T	Statistics and Transforms	3	-	-	3	20	20	60	100	45	3
4.	BSC	25II202P	Statistics and Transforms Lab	-	-	2	1	-	25	25	50	25	-
5.	ESC	25II203T	Python Programming	3	-	-	3	20	20	60	100	45	3
6.	ESC	25II203P	Python Programming Lab	-	-	2	1	-	25	25	50	25	-
7.	ESC	25II204P	Electronics Lab	-	-	4	2	-	25	25	50	25	-
8.	PCC	25II205T	Digital Circuits	2	-	-	2	10	10	30	50	23	1.5
9.	AEC	25II206P	Business Communication Skills – II Lab	-	-	2	1	-	25	25	50	25	-
10.	IKS	25II107T	Indian Knowledge System#	2	-	-	2	10	10	30	50	23	1.5
11.	CC	25II208P	Co-curricular Courses – II	-	-	4	2	-	50	-	50	25	-
Total				12	-	16	20	70	245	335	650	-	-

 # - Course is to be taken online through NPTEL

		July 2025	NEP 3.0	Applicable for 2025-26
Chairman - BoS	Dean – Academics	Date of Release	Version	

SEMESTER II

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
25II201T	Applied Chemistry	2	-	-	2	10	10	30	50

Course Objectives	Course Outcomes
1. To impart knowledge on water chemistry, electrochemical phenomena, types of fuels and lubricants 2. To enhance analytical skills in solving numerical problems related to hardness of water, calorific values of fuel. 3. To cultivate an awareness of the importance of material selection and corrosion prevention strategies.	**Students will be able to** 1. Analyze the concepts of hardness of water and apply it for industrial water treatment. 2. Evaluate the performance and advantages of Li-Ion battery, fuel cell and photochemical cell in terms of efficiency, working mechanism, and applications. 3. Compare and explain different types of corrosion & its prevention methods. 4. Determine calorific values of fuels using different calorimeters and evaluate the significance of analysis of coal 5. Measure and interpret the important properties of lubricants.

Unit I Water Technology-	**[10 Hrs]**
Hardness of water, Numericals on Hardness, Industrial water treatment- Boiler Troubles- Carry over, Caustic embrittlement, Boiler corrosion, Scale & Sludge formation External treatments - Softening of water by Zeolite process and De-mineralization process, Numericals on Zeolite process. Desalination of sea water- Electro dialysis and Reverse Osmosis process-Principle, methods and advantages	
Unit II Electrochemical Phenomenon & Corrosion	**[10 Hrs]**
Introduction- brief idea about electrochemical & galvanic series; Electrolytic & Electrochemical Cell; Construction, working & Advantages of Li Ion Battery, Fuel Cell, Photochemical Cell. Corrosion- Introduction, Factors affecting corrosion, Types of corrosion, Corrosion prevention- Material & Design selection & Cathodic protection	
Unit III Fuels & Lubricants	**[10 Hrs]**
Fuels: Introduction, Calorific value, HCV & LCV. Determination of calorific value of fuels by Bomb & Boy's calorimeter. Numericals on Dulong's formula. Significance of Proximate and Ultimate analysis of Coal. **Lubricants:** Introduction, Classification, Mechanisms. Properties & Significance of liquid lubricants–Viscosity and viscosity index, Flash and fire point, Cloud and pour point, Aniline point, acid value, saponification number. Numerical on Viscosity Index	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Text Book of Engineering Chemistry	S.S. Dara,	New	S. Chand and Company Ltd. New Delhi.
2	Textbook of Engineering Chemistry	P.C. Jain and Monica Jain	Sixth	Dhanpat Rai and Sons, New Delhi.

Reference Books

S.N	Title	Authors	Edition	Publisher
1	A Text book of Engineering Chemistry	Shashi Chawla	Ist	DhanpatRai& Sons, New Delhi
2	Applied Chemistry	N. Krishnamurthy:P. Vallinavagam. And K. Jeysubramanian	Ist	TMH

SEMESTER II

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
25II201P	Applied Chemistry Lab	-	-	2	1	25	25	50

Course Objectives	Course Outcomes
Students will be able to 1. To develop practical skills for analyzing water quality parameters, including hardness, alkalinity and turbidity using standard analytical techniques 2. To impart hands-on experience in testing and evaluating fuel and lubricant properties 3. To enable students to use modern analytical instruments	**Students will be able to** 1. Determine hardness of water samples using complexometric titration and virtual simulation experiments. 2. Evaluate key physical properties of lubricating oils 3. Perform proximate analysis of coal and interpret its industrial relevance. 4. Utilize electrochemical and conductometric methods for the quantitative estimation of chemical substances such as acids and metals

Expt. No.	Experiments based on Performance - Any SIX
1	Determination of Hardness (Total, Permanent & Temporary) of Water Sample by Complexometric method
2	Determination of heavy metal from industrial effluent by colorimeter
3	Determination of Flash point by using Cleveland Open cup flash point apparatus / Abel's Close cup apparatus / Pensky Marten close cup apparatus
4	Determination of viscosity of lubricating oil at different temperature by Redwood Viscometer No.1 OR No. 2
5	Proximate analysis of coal -Determination of % of Moisture, Volatile Matter and Ash in coal sample
6	Determination of Neutralisation number (Acid value) of oil.
7	Determination of Cloud point & pour point from given lubricating oil
8	Determination of strength of the given acid Conductometrically
Demonstration - Any ONE	
1	Measurement of pH of sample from different sources by Digital pH Meter.
2	Determination of Consistency of grease by Penetrometer.
3	Determination of turbidity from industrial effluent.
4	Determination of calorific value of solid/ liquid fuel by using Bomb calorimeter.
Virtual Experiment - Any ONE	
1	Determination of Alkalinity of Water Sample using Warder method
2	Determination of Hardness from Tap water/ Well water/ Sea water
3	Estimation of DO content of Water sample.
Activity - Any ONE	
1	Visit of nearby industrial chemicals and safety measures.
2	Estimation of Air /Water Pollution Level at different Sites in Nagpur City.
3	Visit to Water Treatment Plant/Effluent Treatment Plant

Text Books

S.N	Title	Authors	Edition	Publisher
1	A Textbook on experiment and calculation in engineering chemistry	S.S. Dara	9th	S.Chand

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Applied Chemistry theory and practical	O.P. Virmani and A.K. Narular	Ist	New Age International
2	Laboratory Manual on Engineering Chemistry	Dr. Subdharani	Ist	Dhanpat Rai Publishing

		July 2025	NEP 3.0	Applicable for 2025-26
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SECOND SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
25II202T	Statistics and Transforms	3	-	-	3	20	20	60	100

Course Objectives	Course Outcomes
This Course is intended to: 1. To equip students with the skills to analyze, interpret, and model statistical data using appropriate computational and analytical techniques. 2. To develop students' understanding of integral transforms and their application in solving differential equations and engineering problems.	**Students will be able to:** 1. Solve numerical integration and find analytical solutions to difference equations. 2. Apply statistical methods such as regression, correlation, and least squares fitting to analyze data. 3. Apply Laplace and inverse Laplace transforms with their properties and theorems to evaluate integrals and solve differential equations. 4. Compute Fourier series for periodic functions and apply Fourier transform to convert signals into frequency domain

Unit I	**[9hrs]**
Finite Differences: Operator E and delta, Factorial Polynomial, Numerical integration: Trapezoidal rule, Simpson's 1/3 rule, Simpson's 3/8 rule, Difference equations with constant coefficients.	
Unit II	**[9hrs]**
Statistics: Fitting of straight line, parabola and exponential curves by method of least squares, Coefficient of correlation and lines of regressions, Rank correlation, Multiple regression.	
Unit III	**[9hrs]**
Laplace Transform –I : Definition, Properties, Evaluation of Integrals by Laplace Transform.	
Unit IV	**[9hrs]**
Laplace Transform –II : Inverse Laplace Transform and its properties, Convolution theorem(Statement only), Unit Step Function, Periodic function, Applications of Laplace Transform.	
Unit V	**[9hrs]**
Fourier Series and Fourier Transform: Introduction to Fourier series, Concept of even and odd function, Definition, properties, Fourier Integral Theorem, Relation with Laplace Transform, Applications of Fourier Transform.	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Higher Engineering Mathematics	B. S. Grewal	38th	Khanna Publishers, New Delhi.
2	Higher Engineering Mathematics	H. K. Dass and Er. Rajnish Verma	1st	S. Chand & Co. Pvt. Ltd., New Delhi.

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Higher Engineering Mathematics	B. V. Ramana	11th reprint, 2010.	Tata McGraw-Hill Publications, New Delhi.
2	A Text Book of Engineering Mathematics	Peter O' Neil	8th	Thomson Asia Pvt. Ltd., Singapore.

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Chairman - BoS	Dean – Academics	Date of Release	Version	

SECOND SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
25II202P	Statistics and Transforms Lab	--	--	2	1	25	25	50

Course Objectives	Course Outcomes
This Course is intended to: 1. To equip students with the ability to solve mathematical problems in calculus, discrete mathematics, and applied models by integrating symbolic and numerical techniques using SageMath. 2. To interpret mathematical outcomes through transforms, series, and regression-based analysis in SageMath environment.	**Students will be able to:** 1. Apply symbolic and numerical computation techniques using Sage Math to solve problems in calculus and discrete mathematics. 2. Analyze and interpret mathematical models using data fitting, correlation, and regression techniques. 3. Develop mathematical representations of functions using Laplace and Fourier transforms and apply them to solve engineering problems.

List of Experiments:-

Experiment No.	List of Experiment
1	To compute factorial polynomials for a given algebraic function with the help of SageMath.
2	To evaluate definite integrals by employing SageMath using Numerical Techniques.
3	To fit linear and quadratic models by means of the SageMath environment using least squares method.
4	To calculate the correlation coefficient and derive regression lines through the use of SageMath tools.
5	To determine Spearman's rank correlation coefficient with the help of SageMath.
6	To verify properties of Laplace Transform using SageMath.
7	To determine the Laplace and inverse Laplace transforms of various mathematical functions using SageMath.
8	To solve linear ordinary differential equations with initial conditions using the Laplace transform approach in SageMath.
9	To compute Fourier coefficients and construct the Fourier series of periodic functions using SageMath.
10	To compute the Fourier Transform and Inverse Fourier Transform of continuous-time functions using symbolic tools in SageMath.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Computational Mathematics with SageMath	Paul Zimmermann	1st	SIAM Publications Library.
2	Basics of SageMath : Mathematics(Practicals)	Varun Kumar	1st	Amazon KDP

Reference Books/Resourses

S.N	Title	Authors	Edition	Publisher
1	Mathematics-SageMath Math Software System	Indrajeet Varhadpande & Dr. Kirti Sahu	1st	Himalaya Publication
2	Applied Mathematics Using SageMath	Dr. Kirti Sahu & Dr. Sajid Anwar	1st	Himalaya Publication

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Industrial IoT

SECOND SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits		Evaluation		
						MSE	CA	ESE	Total
25II203T	Python Programming	3	-	-	3	20	20	60	100

Course Objectives	Course Outcomes
1. Elucidate the basic structure and syntax of the Python programming language. 2. Develop problem-solving skills using C programming constructs. 3. Implement programs using control statement, use functions, and leverage modular programming. 4. Apply built-in data structures like strings, lists, tuples, dictionaries, and sets to solve computational problems.	1. Explain how Python's syntax and data types differ from other programming languages like C, and summarize their advantages.. 2. Write Python programs using control structures and user-defined functions to solve basic computational problems. 3. Analyze various Python data structures (lists, tuples, dictionaries, sets) and evaluate their suitability for specific problem-solving scenarios. 4. Assess the efficiency of file handling and object-oriented programming techniques in managing data and optimizing program structure. 5. Develop a Python-based IoT application integrating data visualization and numerical computations to address a real-world problem.

Unit I Introduction to Python **[10 Hrs]**

History and features of Python, setting up the Python environment, Introduction to the Python interpreter and Python, Writing and executing the first Python program, Python syntax vs. C syntax, Variables, keywords, and identifiers, Indentation and comments, Data Types and Operations: Basic data types (int, float, str, bool), Type conversion and casting, Operators (arithmetic, comparison, logical, bitwise), Input/Output Operations: Taking input from the user, Output formatting

Unit II Control Structures and Functions **[10 Hrs]**

Control Structures: Conditional statements (if, elif, else), Loops (for, while), Loop control statements (break, continue, pass), Functions: Defining and calling functions, Function arguments and return values, Scope of variables, Recursive functions, Modules and Packages: Importing modules, Standard libraries overview, Creating and using custom modules

Unit III Data Structures **[8 Hrs]**

Strings: String operations and methods, String formatting, Lists: List operations and methods, List comprehensions, Tuples: Tuple operations and methods, Dictionaries: Dictionary operations and methods, Sets: Set operations and methods

Unit IV Arrays, Strings and Pointers **[8 Hrs]**

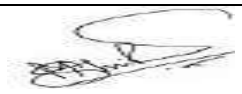
File Handling: Reading and writing files, Working with CSV files, Object-Oriented Programming: Classes and objects, Inheritance and polymorphism, Encapsulation and data hiding, Regular Expressions: Pattern matching and searching, Using re module

Unit V Python for IoT **[9 Hrs]**

Basic signal processing using Python, Plotting and visualizing data using matplotlib, Introduction to numpy for numerical computations, Real-world problem-solving using Python

Books and References

S.No.	Title	Authors	Edition	Publisher
1.	Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython	Wes McKinney	2nd	O'Reilly Media
2.	Data Structures and Algorithms in Python	Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser	1st	Wiley
3.	Python Programming: An Introduction to Computer Science	John Zelle	3rd	Franklin, Beedle & Associates Inc.
4.	Problem Solving and Python Programming	E. Balagurusamy	1st	McGraw Hill Education

		July 2025	NEP 3.0	Applicable for 2025-26
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SECOND SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
25II203P	Python Programming Lab	-	-	2	1	25	25	50

Course Objectives	Course Outcomes
Student will be able to - **1. Develop Practical Coding Skills:** Enable students to gain hands-on experience in writing and executing Python programs **2. Apply Problem-Solving Techniques:** Encourage students to use Python to solve real-world problems by applying control structures, data structures, and functions. **3. Introduce Advanced Python Concepts** such as object-oriented programming, regular expressions, and data visualization, preparing them for practical applications in their field.	**Student will be able to -** **1.** To write and execute Python programs demonstrating correct usage of basic syntax, data types, and operators. **2.** To demonstrate the ability to implement control structures such as loops and conditional statements to solve problems efficiently. **3.** To adept at defining and calling functions, passing arguments, and returning values, as well as creating and using Python modules for modular programming. **4.** To create and manipulate fundamental data structures and applying them to solve practical problems. **5.** To demonstrate an understanding of file handling, exception management, object-oriented programming concepts, and data visualization, enabling them to handle more complex programming tasks and real-world applications.

Expt. No.	Title of the experiment
1	Writing simple programs to demonstrate basic syntax and data types.
2	Practice programs for input/output operations and type conversions.
3	Programs to demonstrate control structures and loops.
4	Writing functions for various mathematical and logical operations.
5	Creating and using modules in Python.
6	Programs to manipulate strings and use string methods.
7	Creating and manipulating lists, tuples, dictionaries, and sets.
8	Real-world applications of data structures in solving problems.
9	Writing programs for file handling and exception management.
10	Creating classes and objects, and implementing OOP concepts.
11	Using regular expressions to search and manipulate text.
12	Signal processing tasks such as filtering and analyzing signals.
13	Visualizing data using matplotlib.

Books and References

S.No.	Title	Authors	Edition	Publisher
1.	Python for Data Analysis: Data Wrangling with Pandas, NumPy, and IPython	Wes McKinney	2nd	O'Reilly Media
2.	Data Structures and Algorithms in Python	Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser	1st	Wiley
3.	Python Programming: An Introduction to Computer Science	John Zelle	3rd	Franklin, Beedle & Associates Inc.
4.	Problem Solving and Python Programming	E. Balagurusamy	1st	McGraw Hill Education

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SECOND SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
25II204P	Electronics Lab	-	-	4	2	25	25	50

Course Objectives	Course Outcomes
The objectives of this course are to: 1. Familiarize students with basic electronic components and measuring instruments, and enable them to verify the characteristics of semiconductor devices. 2. Develop practical knowledge of rectifier circuits and introduce the fundamentals of digital electronics through logic gates and combinational circuits. 3. Introduce the fundamental concepts and characteristics of operational amplifiers. 4. Develop skills to design simple electronic circuits using bipolar junction transistors (BJTs).	After successful completion of this course, students will be able to: 1. Identify and explain the function of basic electronic components such as resistors, capacitors, diodes, LEDs, and LDRs. Also, Plot and analyze V–I characteristics of semiconductor diodes 2. Construct half-wave and full-wave rectifier circuits and evaluate their performance by calculating ripple factor with and without filters. 3. Explain the ideal and practical characteristics of operational amplifiers and analyze inverting and non-inverting amplifier circuits using op-amplifiers. 4. Verify and interpret truth tables of basic logic gates, universal logic gates and combinational logic circuits 5. Design and test a touch sensor circuit using a BJT transistor and explain its working principle.

Expt. No.	Title of the experiment
1	To study different electronic components.
2	To verify V-I characteristics of semiconductor diode and identify the types of diode.
3	To study Electronic Circuit using LDR & LED.
4	To study the performance of half wave rectifier circuit and calculate ripple factor with and without filter.
5	To study the performance of full wave bridge rectifier circuit and calculate ripple factor with and without filter.
6	Study of basic properties of operational amplifier: inverting and non-inverting amplifiers
7	Study of Differentiator and Integrator using Operational Amplifier
8	To design a touch sensor circuit using BJT transistor
9	To verify the Truth Tables of different logic gates (AND, OR, NOT, EX-OR, EX-NOR)
10	To verify the Truth Tables of Universal logic gates (NAND, NOR)
11	To verify the truth table of multiplexer circuit.
12	To verify the truth table of de-multiplexer circuit.
13	Generation of Clock Pulse using NAND gate.

Books and References

S.No	Title	Authors	Edition	Publisher
1.	Electronics Fundamentals and Applications	D. Chattopadhyay and P. C. Rakshit	11th	New Age International
2.	Modern Digital Electronics	R. P. Jain	4th	Tata McGraw-Hill
3.	Electronic Devices	Thomas L. Floyd	10th	Pearson Education
4.	Operational Amplifiers and Linear Integrated Circuits	Ramakant A. Gayakwad	4th	Pearson Education

		July 2025	NEP 3.0	Applicable for 2025-26
Chairman - BoS	Dean – Academics	Date of Release	Version	

SECOND SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits		Evaluation		
25II205T	Digital Circuits	2	-	-	2	MSE	CA	ESE	Total
						10	10	30	50

Course Objectives	Course Outcomes
1. Apply binary number systems, Boolean algebra, and logic simplification techniques to analyze digital circuits. 2. Design and analyze combinational logic circuits including arithmetic units, multiplexers, decoders, and programmable logic devices. 3. Analyze and design sequential logic circuits using flip-flops, counters, registers.	1. Apply number systems to represent truth tables and minterms, and use Boolean algebra, logic gates, and Karnaugh map techniques to simplify and implement Boolean functions. 2. Design and analyze combinational digital circuits including arithmetic units, code converters, multiplexers, decoders, and programmable logic devices. 3. Implement and examine sequential digital circuits such as flip-flops, counters, and registers using state diagrams and excitation tables.

Unit I: Binary Systems, Boolean Algebra, Logic Gates And Boolean Functions	**[11 Hrs]**
Binary Numbers, Number Base Conversions, Octal and Hexadecimal Numbers, Complements, Signed Binary Numbers, Binary Codes, Binary Storage and Registers, Binary Logic, Basic Definitions, Axiomatic Definition of Boolean Algebra, Basic Theorems and Properties of Boolean Algebra, Boolean Functions, Canonical and Standard Forms, Other Logic Operations Digital Logic Gates, Integrated Circuits, The Map Method, Two- and Three-Variable Maps, Four-Variable Map, Product of Sums Simplification, NAND and NOR Implementation, Other Two-Level Implementations, Don't-Care Conditions, The Tabulation Method, Determination of Prime Implicants, Selection of Prime Implicants	
Unit II: Combinational Logic Circuits and Programmable Logic Devices	**[10 Hrs]**
Design Procedure, Adders, Subtractors, Code Conversion, Analysis Procedure, Multilevel NAND Circuits, Multilevel NOR Circuits, Exclusive-OR Functions, Binary Adder and Subtractor, Decimal Adder, Magnitude Comparator, Decoders and Encoders, Multiplexers Read-Only Memory (ROM), Programmable Logic Array (PLA), Programmable Array Logic (PAL)	
Unit III: Sequential Logic Circuits and Counter Design	**[9 Hrs]**
Flip-Flops, Triggering of Flip-Flops, Analysis of Clocked Sequential Circuits, State Reduction and Assignment, Flip-Flop Excitation Tables, Design Procedure, Design of Counters, Registers, Shift Registers, Ripple Counters, Synchronous Counters	

TEXT BOOKS

S. No.	Title	Authors	Edition	Publisher
1.	Digital Logic and Computer Design	M. Morris Mano	---	Pearson Education Pvt. Ltd.
2.	Fundamentals of Digital Circuits	A. Anand Kumar	---	Prentice Hall of India (PHI)

REFERENCE BOOKS

S. No.	Title	Authors	Edition	Publisher
1.	Digital Systems	Ronald J. Tocci:		Pearson Education Pvt. Ltd.
2.	Digital Electronics	Anil K. Maini		Wiley

SECOND SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
25II206P	Business Communication Skills - II Lab	-	-	2	1	25	25	50

Course Objectives	Course Outcomes
To empower students to develop a career-oriented mindset while harnessing the power of LSRW skills.	**Students would be able to:** 1. Participate in Group Discussions. 2. Improve their reading and formal writing skills. 3. Develop upon their listening skills to engage in meaningful conversations. 4. Develop oratory skills to engage and inform audiences. 5. Prepare themselves for participating in business meetings.

Expt. No.	Title of the experiment
1	Group Discussion
2	Reading for Competitive Exams II
3	Listening Skills II
4	Presenting a TED Talk
5	Media Interaction
6	Business Correspondence II
7	Report Writing
8	Mock Meeting

Reference Books

S. N	Title	Authors	Edition	Publisher
1.	Communication Skills for Engineers	C. Muralikrishna & SunitaMIshra	2nd Edition, 2011	Pearson India Education Services
2.	Communication Skills	Dr. L. Bisen, Dr. B. Agrawal& Dr. N. T. Kalyani	1st Edition, 2021	Himalaya Publishing House
3.	Barron's IELTS Superpack	Lin Lougheed	2012	Barrons Educational Series

SECOND SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
25II107T	Indian Knowledge Systems	2	-	-	2	10	10	30	50

Course Objectives	Course Outcomes
This course is intended to 1. To understand the distinctive features of Indian Knowledge Traditions. 2. To explore India's contributions in science, mathematics, astronomy, technology, and architecture. 3. To connect IKS concepts with modern applications and sustainable practices.	**Students will be able to** 1.Comprehend the foundations of Indian Knowledge System and its difference from Western approaches. 2.Analyze India's contributions in mathematics, astronomy, and technology. 3.Appreciate the relevance of art, architecture, and traditional sciences in modern contexts.

Unit I FOUNDATIONS OF IKS **[8Hrs]**

Introduction to the Indian Knowledge System with its distinctive features in contrast to Western thought, the Vedic corpus including the Vedas, Upaniṣads, and associated philosophical traditions, knowledge traditions of Śikṣā dealing with phonetics, Vyākaraṇa focusing on grammar, Nirukta exploring etymology, Chandas emphasizing prosody, Kalpa codifying rituals and social duties, Jyotiṣa concerning astronomy and timekeeping, and reflective Discover IKS activities based on case studies and experiential learning.

Unit II SCIENTIFIC AND TECHNOLOGICAL CONTRIBUTIONS **[8Hrs]**

Mathematics including the number system, importance of zero, contributions of Brahmagupta, developments in geometry and algebra, ancient Indian astronomy and its observations, contributions of Parāśara and Garga, connections between astronomical knowledge and Vedic rituals, engineering and technology in ancient India covering metallurgy and advanced metalworking, healthcare practices and their scientific basis, construction of granite structures and architectural precision, Harappan technology and innovations in urban planning, maritime traditions and shipbuilding heritage, case studies on the works of Indian mathematicians, the astronomical observatory of Jantar Mantar, and the corrosion-resistant Iron Pillar of Delhi.

Unit III Art, Architecture & Sustainable Knowledge **[8Hrs]**

Town planning traditions from the Harappan civilization to classical India, rock-cut architecture including the Ellora caves, Kailasanātha temple, and Buddhist cave traditions, principles of temple design and Vastu Shastra, indigenous engineering in art and architecture blending aesthetics, science, and spirituality, relevance of IKS in contemporary contexts through sustainability, holistic living, and eco-conscious design.

Text Books

Sr.	Title	Authors	Edition	Publisher
1	Indian Knowledge System	Kapil Kapoor & Michel Danino(Eds.)	1st	PHI Learning
2	Foundations of Indian Culture and Knowledge System	B. L. Atreya	Reprint	Bharatiya Vidya Bhavan
3	Essays on Indian Knowledge Systems	Michael Danino	1st	AICTE – IKS Division

Reference Books

Sr. No.	Title	Authors	Edition	Publisher
1	Indian Knowledge Systems: Nature, Philosophy and Manifestation	Bal Ram Singh, Pushpesh Pant	1st	Pratibha Prakashan
2	The Science and Technology in Ancient India	Debiprasad Chattopadhyaya	Reprint	People's Publishing House

		JULY 2025	NEP 3.0	Applicable for 2025-26
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