Curriculum of Diploma Programme

in

Computer Science & Engineering

**Department of Science, Technology and Technical
Education (DSTTE), Govt. of Bihar**

**State Board of Technical Education
(SBTE), Bihar**

Semester – II
Teaching & Learning Scheme

Course Codes	Category of course	Course Titles	Classroom Instruction (CI)		Lab Instruction (LI)	Notional Hours (TW+ SL)	Total Hours (CI+LI+TW+SL)	Total Credits (C)
			L	T				
2418101	BCC	**Programming with C** (CSE, AIML)	03	-	04	02	09	06
2418102	BCC	**Web Technology** (CSE, AIML)	03	-	04	02	09	06
2400103B	ASC	**Applied Chemistry -B** (CSE, AIML, EE, ELX, ELX (R))	03	-	04	02	09	06
2400104	HSC	**Communication Skills (English)** (Common for all Programmes)	03	-	04	02	09	06
2400105B	ASC	**Applied Mathematics -B** (CSE, AIML)	02	01	-	02	05	04
2400107	NRC	**Professional Ethics** (CE, CSE, ELX, ELX (R), FTS, ME, AIML, MIE, CHE, CRE, FPP, GT, EE, AE, CACDDM)	01	-	-	-	01	01
2400108	NRC	**Essence of Indian Knowledge System and Tradition** (Common for All Programmes)	01	-	-	-	01	01
		Total	**16**	**1**	**16**	**10**	**43**	**30**

Note: Prefix will be added to Course Code if applicable (T for Theory, P for Practical Paper and S for Term Work)

Legend:

CI: Classroom Instruction (Includes different instructional/implementation strategies i.e. Lecture (L), Tutorial (T), Case method, Demonstrations, Video demonstration, Problem based learning etc. to deliver theoretical concepts)

LI: Laboratory Instruction (Includes experiments/practical performances /problem-based experiences in laboratory, workshop, field or other locations using different instructional/Implementation strategies)

Notional Hours: Hours of engagement by learners, other than the contact hours for ensuring learning.

TW: Term work (includes assignments, seminars, micro projects, industrial visits, any other student activities etc.)

SL: Self Learning, MOOCs, spoken tutorials, online educational resources etc.

C: Credits = (1 x CI hours) + (0.5 x LI hours) + (0.5 x Notional hours)

Note: TW and SL have to be planned by the teacher and performed by the learner under the continuous guidance and feedback of teacher to ensure outcome of learning.

Semester - II
Assessment Scheme

Course Codes	Category of course	Course Titles	Assessment Scheme (Marks)						Total Marks (TA+TWA+LA)
			Theory Assessment (TA)		Term work & Self-Learning Assessment (TWA)		Lab Assessment(LA)		
			Progressive Theory Assessment (PTA)	End Theory Assessment (ETA)	Internal	External	Progressive Lab Assessment (PLA)	End Laboratory Assessment (ELA)	
2418101	BCC	Programming with C (CSE, AIML)	30	70	20	30	20	30	200
2418102	BCC	Web Technology (CSE, AIML)	30	70	20	30	20	30	200
2400103B	ASC	Applied Chemistry -B (CSE, AIML, EE, ELX, ELX (R))	30	70	20	30	20	30	200
2400104	HSC	Communication Skills (English) (Common for all Programmes)	30	70	20	30	20	30	200
2400105B	ASC	Applied Mathematics -B (CSE, AIML)	30	70	20	30	-	-	150
2400108	NRC	Essence of Indian Knowledge System and Tradition (Common for All Programmes)	25	-	-	-	-	-	25
2400107	NRC	Professional Ethics (CE, CSE, ELX, ELX (R), FTS, ME, AIML, MIE, CHE, CRE, FPP, GT, EE, AE, CACDDM)	25	-	-	-	-	-	25
Total			200	350	100	150	80	120	1000

Note: Prefix will be added to Course Code if applicable (T for Theory, P for Practical Paper and S for Term Work)

Legend:

PTA: Progressive Theory Assessment in class room (includes class test, mid-term test and quiz using online/offline modes)

PLA: Progressive Laboratory Assessment (includes process and product assessment using rating Scales and rubrics)

TWA: Term work & Self Learning Assessment (Includes assessment related to student performance in assignments, seminars, micro projects, industrial visits, self-learning, any other student activities etc.

Note:

- ETA & ELA are to be carried out at the end of the term/ semester.
- Term Work is to be done by the students under the guidance of internal faculty but its assessment will be done **internally (40%)** as well as **externally (60%)**. Assessment related to planning and execution of Term Work activities like assignment, micro project, seminar and self-learning is to be done by internal faculty (Internal Assessment) whereas assessment of output/product/ presentation related to these activities will be carried out by external faculty/expert (External Assessment). However, criteria of internal as well as external assessment may vary as per the requirement of respective course. For valid and reliable assessment, the internal faculty should prepare checklist & rubrics for these activities.

J)   Theory Session Outcomes (TSOs) and Units: T2418101

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
TSO 1a. Write Pseudo program logic for the given problem. TSO 1b. Identify the given symbols of a flow chart. TSO 1c. Explain guidelines for preparing flowchart with example. TSO 1d. Create flowchart to logically solve the given problem.	**Unit-1.0 Program Logic Development** **1.1 Fundamentals of Algorithms:** Notion of an algorithm. Pseudo-code conventions like assignment statements and basic control structures. **1.2 Algorithmic Problems:** Develop fundamental algorithms to solve simple problems such as: (i) solve simple arithmetic expression (ii) find the greatest of three numbers (iii) determine whether a given number is even or odd (iv) determine whether a given number is prime. **1.3 Flowchart:** Flowchart, Symbols of flowchart, Guidelines for preparing Flowchart	**CO1**
TSO 2a. Identify the given building block of a C program. TSO 2b. Write simple 'C' program using the given arithmetic expressions TSO 2c. Write a simple 'C' Program demonstrating the given data type conversion TSO 2d. Write I/O Statements for the given data.	**Unit-2.0 Basics of C Programming** **2.1 Introduction to C**: History of 'C' General Structure of a 'C' program: Header files, 'main' function. **2.2 Data Concepts:** Character set, tokens, keywords, Identifiers, Variables, Constant, data types, C operators, Arithmetic operators, Arithmetic expression, declaring variables, and data type conversion. **2.3 Basic Input Output:** Input and Output statements, using printf() and scanf(), character input/output statements, Input/output formatting, Use of comments	**CO2**
TSO 3a. Write a 'C' program using decision making structure for two-way branching to solve the given problem. TSO 3b. Write a 'C' program using decision making structure for multi-way branching to solve the given problem. TSO 3c. Write a 'C' program using loop statements to solve the given iterative problem. TSO 3d. Use appropriate statements to change the program flow in the given loop.	**Unit-3.0 Decision Making and Branching** **3.1 Decision Making and Branching**: Relational and logical operators, if statement, if else statement, nested if-else, if-else ladder', The switch statement **3.2 Looping:** while loop, do… while loop for loop, go to statement, Use of break and continue statements	**CO3**
TSO 4a. Write statements to read, write the given array. TSO 4b. Manipulate the given array of characters and numbers. TSO 4c. Use the structure for solving the given problem. TSO 4d. Write a sample program to demonstrate use of the given enumerated data type.	**Unit-4.0 Array and Structure** **4.1** Characteristics of an array, One dimension and two-dimension arrays, Array declaration and Initialization **4.2** Array of characters, Operation on array Character and String input/output **4.3** Introduction and Features of Structures, Declaration and Initialization of Structures Typedef, Enumerated Data Type, using structures in C Program	**CO4**
TSO 5a. Use the given Library function. TSO 5b. Develop user defined functions for the given problem. TSO 5c. Write 'C' codes to pass the given function parameters using "call by value" and "call by	**Unit-5.0 Concept and Need of Functions** **5.1** Library functions: Math functions, String handling functions, other miscellaneous functions.	**CO5**

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
reference" approach. TSO 5d. Write recursive function for the given problem.	5.2 Writing User defined functions, scope of variables, Parameter passing: call by value, call by reference. 5.3 Recursive functions	
TSO 6a. Use pointers to access memory locations using pointer to solve the given problem. TSO 6b. Use pointers for performing the given arithmetic operation. TSO 6c. Develop a program to access elements of the given array using pointers. TSO 6d. Develop a program to access elements of the given structure using pointers.	Unit-6.0 Pointers 6.1 Concepts of pointers: declaring, initializing, accessing, Pointer arithmetic. 6.2 Handling arrays using pointers, Handling functions using pointers, Handling structures using pointers	CO6

Note: One major TSO may require more than one Theory session/Period.

K) Suggested Laboratory (Practical) Session Outcomes (LSOs) and List of Practical: P2418101

Practical/Lab Session Outcomes (LSOs)	S. No.	Laboratory Experiment/Practical Titles	Relevant COs Number(s)
LSO 1.1. Write, execute and debug simple 'C' program LSO 1.2. Write and execute simple 'C' program using variables, arithmetic expressions	1.	(a) Develop minimum 3 programs using Constants, Variables, arithmetic expression. (b) Develop minimum 3 programs to exhibiting use of increment/decrement operators, data type conversion	CO1, CO2
LSO 2.1. Use scanf statement to take user input. LSO 2.2. Use printf statement to print the output.	2.	(a) Write simple program to convert temperature in Fahrenheit degrees to Centigrade degrees. (take input from the user)	CO1, CO2
		(b) Write simple programs to calculate the area and perimeter of the rectangle, and the area & circumference of the circle (take input from the user)	CO1, CO2
LSO 3.1. Write C Program using Decision Making and two-way branching statements.	3.	Write program to: (a) Determine whether a given year is a leap year or not. (b) Determine whether a string is palindrome. (c) Find the greatest of the three numbers using conditional operators (d) Find if a given character is vowel (use if-else ladder).	CO1, CO2, CO3
LSO 4.2. Write C Program using "switch-case" statement for multi-way branching. LSO 4.2. Use the "if" and "Switch" statements appropriately for decision making in C Program.	4.	Using switch statement- Write program to: (a) Print day of week by taking number from 1 to 7. (b) Print a student's grade ("A", "B", "C" etc.) by accepting his/her percent marks. (c) Find if a given character is vowel. (d) Using "if" and "switch" statements-	CO1, CO2, CO3

Practical/Lab Session Outcomes (LSOs)	S. No.	Laboratory Experiment/Practical Titles	Relevant COs Number(s)
		Write programs to check whether the triangle is equilateral, isosceles, or scalene triangle.	

LSO 5.1 Write and execute C programs using various types of loop statements to solve iterative problems.	5.	Write Program to:
		(a) Find sum of digits of a given number.
		(b) Generate multiplication table up to 10 for numbers 1 to 5.
		(c) Find Fibonacci series for given number.
		(d) Write a program to produce the following output:
		
		      1
		   2 3
		  4 5 6
		 7 8 9 10
			CO1, CO2, CO3

LSO6.1 Write and execute C programs using one-dimension array. LSO 6.2 Write and execute C program using two-dimensional array.	6	Develop a Program to: (a) Sort list of 10 numbers. (b) Perform addition of 3x3 matrix.	CO1, CO2, CO3, CO4
LSO 7.1 Write and execute C program using Structures to solve given problem.	7	Develop Program to: (a) Create a structure called "library" to hold details of a book viz. accession number, title of the book, author name, price of the book, and flag indicating whether book is issued or not. Fetch some sample data and display the same. (b) Develop and execute C Program to Add Two Distances given in kilometer-meter Using Structures.	CO1, CO2, CO3, CO4
LSO8.1 Write C program using different types of library functions to solve given problem. LSO8.2 Write C program to Create and use user defined functions	8	Develop Program to demonstrate: (a) Use of all String handling functions. (b) Use of few Mathematical functions. (c) Use of few other miscellaneous functions. Develop a Program to: (a) Create a function to find GCD of given number. Call this function in a program. (b) Find Factorial of given number using recursion.	CO1, CO2, CO3, CO4, CO5
LSO 9.1 Write C program using pointers to manipulate the data by accessing the computer's memory	9	(a) Develop a Program to Print values of variables and their addresses. (b) Develop a Program to Find sum of all elements stored in given array using pointers.	CO1, CO2, CO3, CO4, CO6

L)   **Suggested Term Work and Self Learning: S2418101** Some sample suggested assignments, micro project and other activities are mentioned here for reference.

   a. Assignments: Questions/Problems/Numerical/Exercises to be provided by the course teacher in line with the targeted COs.

J)   Theory Session Outcomes (TSOs) and Units: T2418102

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
TSO 1a. Explain the working of Client server model. *TSO 1b.* Differentiate characteristics of the given type of web sites *TSO 1c.* host a website on webserver *TSO 1d.* Explain use of head tag and body tag in the given web page. *TSO 1e.* Write HTML codes to format text and page using block level and text level tags on a web page. *TSO 1f.* USe given type of list tag in Web Pages	**Unit-1.0 Fundamentals of World Wide Web (www) and HTML** Information about Web Browsers, URL, Web page, Web site, types of sites. Static vs. dynamic web sites Client-server model, Web Servers, Website Hosting: Concept of Internet and Intranet. Publishing website on Intranet, Installing and configuring web server **1.1 HTML** HTML documents, Web page structure: Tags and attributes, DOCTYPE, head, body, title and other meta tags with attributes. **1.2 Block Level Tags:** Headings, Paragraphs, Breaks, Divisions, Centered Text, Block Quotes, Preformatted text, HR tag. **1.3 Text Level Tags and Special Characters:** Bold, Italic, Underline, Strikethrough, Superscript, Subscript, DIV tag, displaying special characters. **1.4 Lists:** Ordered Lists, Unordered Lists, Definition Lists, Nested Lists.	**CO-1**
TSO 2a. Describe feature of the given type of URL. *TSO 2b.* Use Image Insert and format tags on a web page. *TSO 2c.* Write HTML codes for setting background on a Web Page using the given colors/images. *TSO 2d.* Write HTML codes for creating the given type of hyper linking. *TSO 2e.* Write HTML codes to create and format table to organize data on a web page. *TSO 2f.* Use frames to organize web page display as per given screen layout.	**Unit-2.0 URL, Image, Table and Frame in HTML** **2.1 URL And Anchor Tag:** URL: Types of URLs, pros and cons of relative and absolute URLs, Anchor Tag: Linking various documents for internal and external links, linking to area in same page, linking to other page on specific area. **2.2 Images, Colors and Backgrounds:** Inserting Images, formatting image for sizing, alignment. Border and using other attributes with IMG tag. Inserting image as page background. Creating solid color page background. **2.3 Table**: Table tag with attributes. TABLE, TR, TH, TD tags. Border, cell spacing, cell padding, width, align, bgcolor attributes. **2.4 Frames: Types** of Frames with their attributes, Creating frames: FRAMESET tag – rows, cols attributes.	**CO-2**
TSO 3a. Write CSS code to implement given type of document style on a web page. *TSO 3b.* Use different style sheet properties. *TSO 3c.* Create and use internal CSS file *TSO 3d.* Create and use external CSS file *TSO 3e.* Create CSS for applying the given presentation scheme on a web page.	**Unit-3.0 Cascading Style Sheets** **3.1** Basics of CSS: Different types of Style Sheets, Benefits of using CSS. Adding style to the document: Linking to style sheets, embedding style sheets, Using inline style, Selectors: CLASS rules, ID rules. **3.2 Style sheet properties:** Font, text, box, color and background properties; Creating and Using a simple external CSS file; Using the internal and inline CSS; background and color gradients in CSS Setting font and text in style sheet using table layout.	**CO-3**

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
	Unit-4.0 Basic JavaScript	**CO-4**
TSO 4a. Write and execute JavaScript codes. *TSO 4b.* Use JavaScript to perform arithmetic operations on variables. *TSO 4c.* Write JavaScript codes to implement decision making statements for solving the given problem. *TSO 4d.* Implement loop statements to solve the given iterative problem. Using JavaScript codes *TSO 4e.* Create and use arrays in JavaScript. *TSO 4f.* Use JavaScript popup boxes for taking user's input *TSO 4g.* Use JavaScript popup boxes to alert and prompt user.	**4.1 JavaScript Introduction:** writing and executing JavaScript codes, variables, data types, operators, Pop-up boxes- Alert, confirm and prompt boxes **4.2 Control structure:** control flow- if-else, switch, for, while, do…while loops break and continue statements, Arrays	
TSO 5a. Create and call user defined functions using JavaScript. *TSO 5b.* Use different JavaScript objects. *TSO 5c.* Write JavaScript to handle various events.	**Unit-5.0 Java Script Function, Objects and Events** **5.1 Functions:** Declaring Functions, calling functions with parameters, lifetime of JavaScript variables, JavaScript Objects, String, Date and Math objects, **5.2 Events and exceptions**: JavaScript events, error and exception handling, the try...catch...finally Statement, onerror() Method	**CO-5**

Note: One major TSO may require more than one Theory session/Period.

K) Suggested Laboratory (Practical) Session Outcomes (LSOs) and List of Practical:

Practical/Lab Session Outcomes (LSOs)	S. No.	Laboratory Experiment/Practical Titles	Relevant COs Number(s)

LSO 1.1. create static web pages using block level and text level HTML tags	1	Create a static web page to display sample content using-
		  a) block level HTML tags
		  b) Text level HTML tags
			CO-1

LSO 2.1. Create web pages using ordered and unordered list
LSO 2.2. Create different types of hyperlinking on web page.
	2	a) Create a web page for implementing different types of Lists
		b) Create a web page to link-
		  i) An external page of different web site
		  ii) A specific location on the same page
		  iii) A specific location of an external page
		
		c) Write HTML tags to change colors of links (visited, unvisited etc.)
			CO-2

LSO 3.1. Insert images on web page and adjust its appearance and style.
LSO 3.2. Organize content in specified tabular form in a web page
	3	a) Write HTML codes to-
		  i) Insert images on web page using various attributes
		  ii) Insert image as page background
			CO-2

Practical/Lab Session Outcomes (LSOs)	S. No.	Laboratory Experiment/Practical Titles	Relevant COs Number(s)
LSO 3.3. Use frame tag to split the web browser display		b) Create a web page to demonstrate use of various Table tags. **c)** Create a web page to implement Frame tags	
LSO 4.1 Create Cascading style sheet as per given scheme and apply it on different web pages	**4**	a) Create CSS for applying the given presentation scheme on a web page. b) Create a web page for demonstration of CSS by applying Internal/External/ Inline style on sample content	CO-3
LSO 5.1. Install/Configure web server and publish a website on it	**5.**	a) Install a web server and publish a website on Intranet b) Publish a website on Internet by acquiring space on a free hosting site.	CO-1
LSO 6.1. Write, execute and debug simple JavaScript programs	6.	Develop minimum 2 programs using JavaScript to demonstrate use of Variables, arithmetic expressions.	CO-4
LSO 7.1. Use JavaScript decision making statements for two-way branching *LSO 7.2.* Use JavaScript decision making statements for multi-way branching.	7.	a) Write JavaScript to implement following i) Get the system time. If the time is less than 12, you will get a "Good morning" greeting otherwise you will get a "Good day" greeting ii) Write simple programs to check if income is less than 10000/- then print "below poverty line". b) Write JavaScript code to implement following- Take the user input in number between 1-7 and write the day (Consider the Day 1 as "Monday"….Day 7 as "Sunday"). Also validate the user's input. c) Take input of six courses marks out of 50. Validate the user's input. Write the total marks and percentage marks. d) Take input of 10 Employees id, name, annual salary. Calculate the tax based on the following criteria- i) tax= 3% of the salary, if salary is equal to or greater than 10 lakhs ii) tax= 5% of the salary, if salary is equal to or greater than 15 lakhs iii) tax= 8% of the salary, if salary is equal to or greater than 20 lakhs.	CO-4
LSO 8.1. Write C Program using Decision Making and two-way branching statements.	8.	(a) Create sample webpages and use JavaScript to demonstrate the use of built-in functions. (b) Develop webpages to demonstrate creation and calling of user-defined functions with parameters in JavaScript. (c) Develop sample webpages to demonstrate use of JavaScript Array, Date, Math, and String objects.	CO-4, CO-5

J)   Theory Session Outcomes (TSOs) and Units: T2400103B

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
TSO 1a. Describe the three subatomic particles in an atom. *TSO 1b.* Explain Rutherford model of atom. *TSO 1c.* Apply the different atomic theories and principles for structural illustration. *TSO 1d.* Calculate uncertainty in position and momentum. *TSO 1e.* Draw the shapes of s, p and d orbitals. *TSO 1f.* Write the electronic configuration of different elements. *TSO 1g.* Differentiate between ionic, covalent, and coordinate compounds based on the type of chemical bonding. *TSO 1h.* Explain the unique behavior of water. *TSO 1i.* Prepare the solution of given concentration.	**Unit-1.0 Atomic Structure and Chemical Bonding and Solutions:** 1.1. Atoms and its fundamental particles, 1.2. Rutherford Model of Atom, 1.3. Bohr's Theory, Hydrogen spectrum explanation based on Bohr's Model of Atom, 1.4. Wave Mechanical model of atom, de Broglie relationship, Heisenberg Uncertainty Principle 1.5. Quantum Numbers, Shapes of Atomic Orbitals, 1.6. Pauli's Exclusion Principle, Hand's Rule of Maximum Multiplicity, Aufbau Principle, Electronic Configuration (till atomic number 30). 1.7. Concept of Chemical bonding - Causes of chemical bonding, Types of Bonds: Ionic Bond (NaCl, $CaCl_2$, MgO), Covalent Bond, Polar and Nonpolar Covalent Bonds (H_2. F_2. HF, HCl) & Co-ordinate Bond (CO, NH_4+, O_3, H_2SO_4). 1.8. Dipole Moment (NH_3, NF_3), Hydrogen bonding. 1.9. Solution- (solute, solvent) and their strength- Molarity, Normality, Molality. 1.10. Indian Chemistry: -Philosophy of atom by Acharya Kanad. (IKS)	**CO1**
TSO-2a. Classify hard and soft water based on their properties. *TSO-2b.* List the impurities responsible for hardness. *TSO-2c.* Calculate the hardness of water. *TSO-2d.* Determine the hardness by EDTA method. *TSO-2e.* Apply different water softening techniques to soften the hard water. *TSO-2f.* Calculate the amount of lime and soda required for removal of hardness. *TSO-2g.* Differentiate between BOD and COD. *TSO-2h.* Use the Indian standard specification of drinking water.	**Unit-2.0 Water** 2.1 Introduction, Sources of Water. Hardness of Water- Temporary & Permanent hardness. 2.2 Degree of Hardness (In terms of CaCO3 equivalent), Unit of Hardness, Quantitative Measurement of Water Hardness by EDTA method. 2.3 Municipal supply of Water, Treatment of water, Water Softening Technique-Soda Lime Process, Zeolites method and ion exchange method, 2.4 Water Quality Index - Biological Oxygen Demand, Chemical Oxygen Demand, Determination of Dissolved Oxygen 2.5 Indian standard specification of drinking water.	**CO2**
TSO 3a. List ores of metals. *TSO 3b.* Describe ore, gangue, matrix. *TSO 3c.* Select Appropriate metallurgical processes for concentration, extraction, and purification of given ore. *TSO 3d.* Describe alloy with examples. *TSO 3e.* Write the constituent of given alloy. *TSO 3f.* Write the composition properties and	**Unit-3.0 Engineering Materials** 3.1 Natural Occurrence of Metals- Minerals, ores. 3.2 Metallurgy - General principles of Metallurgy, Gangue, Flux and Slag, Steps involved in metallurgy. 3.3 Ancient Indian Metallurgy (IKS) 3.4 Extraction of Aluminium, Iron and Copper from their important ores along with reactions,	**CO3**

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
	uses of ferrous and non-ferrous alloys. Properties and uses.	
TSO 3g. Distinguish homopolymer, copolymer. TSO 3h. Write the monomers of given polymers. TSO 3i. Explain vulcanization process.	3.5 Alloys – Definition, Purpose of alloying, Ferrous and Non-Ferrous Alloy with suitable examples, Composition, Properties, and their applications. 3.6 Polymers-Homopolymers and Copolymers, Natural polymers and synthetic polymers, Addition and Condensation polymerization, Thermoplastic and Thermosetting plastic. 3.7 Monomers, applications, and synthesis of Polythene, PVC, Orlon, Terylene, Nylon 66, Nylon 6, Bakelite. 3.8 Natural Rubber and its vulcanization, advantages of vulcanized rubber.	
TSO 4a. Differentiate between crystalline and amorphous solid. TSO 4b. Classify crystalline solid based on binding forces. TSO 4c. Classify unit cells based on structure. TSO 4d. Describe imperfections in solid. TSO 4e. Differentiate between metals and semiconductors using band theory. TSO 4f. Explain ferromagnetism and diamagnetism. TSO 4g. Describe Bragg's law. TSO 4h. Describe kjeldah method to determine melting point of crystalline solid.	**Unit-4.0 Solid State** 4.1 General characteristics of solid state, crystalline and amorphous solid. 4.2 Classification of crystalline solid- Molecular, ionic, metallic, covalent solids. 4.3 Crystal lattice and unit cells- Primitive, BCC, FCC 4.4 Imperfections of solid, Types of point defects- stoichiometric defects, impurity defects, non-stoichiometric defects. 4.5 Electrical properties, conduction of electricity in metals and semiconductors- Band theory. 4.6 Magnetic properties- Ferromagnetism, Para magnetism, diamagnetism, anti-ferro magnetism and ferrimagnetism. 4.7 General introduction to X ray diffraction method- *Bragg's* law. **4.8** Melting point determination of crystalline solid by Kjeldahl method.	
TSO-5a. Describe Electrolyte and Nonelectrolyte. TSO-5b. Describe Metallic and electrolytic conduction. TSO-5c. Explain the faraday law of electrolysis. TSO-5d. Calculate the mass of metal deposited after passing a certain amount of current. TSO-5e. Calculate the emf at different temperature, pressure, and molar concentration. TSO-5f. Predict the feasibility of a cell. TSO-5g. Explain the working of a cell. TSO-5h. Describe corrosion. TSO-5i. Explain the different methods to prevent corrosion.	**Unit-5.0 Electrochemistry** 5.1. Introduction, Electrolyte and Nonelectrolyte, Electrolytic and Metallic Conduction, Factors affecting Electrolytic Conductance. 5.2. Molar Conductivity and Equivalent Conductivity. Variation of Molar Conductivity, Kohlrausch's law. 5.3. Faraday's Laws of Electrolysis. 5.4. Galvanic Cell, Electrode Potential, Measurement of Electrode Potential SHE (Standard Hydrogen electrode), EMF, Electrochemical Series, Nernst Equation for Electrode Potential. 5.5. Batteries, Primary Cells-Dry cell, Secondary cell -Lead storage battery, Fuel cells. 5.6. Corrosion, their types (Dry & Wet corrosion) and prevention.	CO5

Note: One major TSO may require more than one Theory session/Period.

K) Suggested Laboratory (Practical) Session Outcomes (LSOs) and List of Practical: P2400103B

Practical/Lab Session Outcomes (LSOs)	S. No.	Laboratory Experiment/Practical Titles	Relevant COs Number(s)
LSO 1.1. Calculate amount of oxalic acid required. LSO 1.2. Prepare N/10 oxalic acid solution.	1.	Preparation of 250 ml of N/10 Oxalic acid Solution	CO1
LSO 2.1. Calculate amount of Sodium carbonate required. LSO 2.2. Prepare N/10 Sodium Carbonate Solution	2.	Preparation of 250ml of N/10 Sodium Carbonate Solution	CO1
LSO 3.1. Perform acid base titration. LSO 3.2. Prepare oxalic acid solution.	3.	Determination of strength of Sodium Hydroxide solution by titrating against Oxalic Acid Solution.	CO1
LSO 4.1. Perform Complexometric titration. LSO 4.2. Standardize EDTA solution.	4.	Determination of the total hardness of tap water by EDTA method.	CO2
LSO 5.1. Perform double displacement reaction. LSO 5.2. Test the presence of sulphate.	5.	Preparation Barium Sulphate from Barium Chloride.	CO2
LSO 6.1. Perform acid base titration using pH meter.	6.	Determination of pH of given solution by pH meter.	CO2
LSO 7.1. Perform iodometry titration. LSO 7.2. Use of starch as indicator.	7.	Determination of Dissolved Oxygen in given Sample of water.	CO2
LSO 8.1. Calculate pH.	8.	Determination pH of soil using baking soda and vinegar.	CO2
LSO 9.1. Carry out Polymerization. LSO 9.2. Set the environment for carrying out polymerization	9.	Preparation of Phenol Formaldehyde Resin (Bakelite)	CO3
LSO-10.1. Seal capillary tube. LSO 10.1. Measure the melting point of acetanilide.	10.	Determination of the melting point of Acetanilide crystals.	CO4
LSO 11.1. Seal capillary tube LSO 11.2. Measure the melting point of benzoic acid.	11.	Determination of the melting point of Benzoic acid crystals.	CO4
LSO-12.1. Construct Daniel cell. LSO-12.2. Compare the effect of dilution of electrolytes on the emf of a Daniel cell.	12.	Comparison of the effect of dilution of electrolytes on the emf of a Daniel cell.	CO5

J) **Theory Session Outcomes (TSOs) and Units: T2400104** The details of TSOs and units for communication in English is mentioned in Part – A while communication in Hindi is mentioned in Part – B in the following table.

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
Part -A (English) TSO1.a Define communication and its different forms. TSO1.b Explain the elements of communication with Case Studies from Bhagwat Geeta's conversation between Krishna and Arjun before the war. (IKS) TSO1.c Explain the linkages between different stages of communication with the help of a diagram. TSO1.d Apply the principles of effective communication and state two examples of communication from Ramayana (IKS) TSO1.e State eight for explaining different types of barriers to communication Case Studies from Mahabharata - the conversation between Kauravas and Pandavas in the war field (IKS) TSO1.f Identify the barriers to communication. TSO1.g Suggest the ways to overcome/minimize communication barriers.	**Unit-1.0 Communication** 1.1 Communication: Role, Relevance, Elements (Context-Sender-Message-Channel-Receiver-Feedback) 1.2 Process / Stages: Ideation- Encoding, Selecting Proper Channel, Transmission, Receiving, Decoding, Giving Feedback 1.3 7 Cs / Principles of Effective Communication: Considerate, Correct, Concrete, Concise, Clear, Complete. Courteous 1.4 Barriers to Communication: Physiological, Physical, Psychological, Mechanical, Semantic/Language, Cultural. Overcome/ minimize Barriers. 1.5 Case Studies from: • Bhagwat Geeta's conversation between Krishna and Arjun before the war (IKS) • Mahabharata the conversation between Kauravas and Pandavas in the war field (IKS)	CO1 CO2
TSO 2a. Distinguish between formal and informal communication Case Studies from Bhagwat Geeta and the different conversations of Krishna and Arjun during the war (IKS). TSO 2b. Illustrate the types of Formal Communication with examples. TSO 2c. Define verbal & non-verbal communication. TSO 2d. TSO 2d. Explain the advantages of oral and written Communication. TSO 2e. Interpret non-verbal codes from Mahabharata (IKS) TSO 2f. Explain the role of tables, charts & graphs in communication. TSO 2g. Differentiate Intrapersonal and Interpersonal Communication with Case Studies TSO 2h. List the advantages and disadvantages of Group Communication.	**Unit- 2.0 Types of Communication** 2.1 Based on organizational structure: Formal (Vertical, Horizontal, Diagonal), Informal (Grapevine) 2.2 Based on the method of expression: Verbal-Oral & Written communication. Non-verbal communication and its Codes- Kinesics, Chronemics, Proxemics, Haptics, Vocalics/Paralanguage, Artifacts, Graphic and Visual Communication 2.3 Based on the number of people involved: Interpersonal, and Group Communication. 2.4 Case Studies from Bhagwat Geeta's different conversations with Krishna and Arjun during the war (IKS).	CO3
TSO 3a. Prepare a glossary of new words from the given texts. TSO 3b. Summarize the given texts in your own words. TSO 3c. Recognize the types of sentences in the given texts.	**Unit-3.0 Reading Comprehension** Comprehension, vocabulary enhancement and grammar exercises based on the reading of the following texts: **Section-1 (Prose)**	CO4 CO5

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
TSO 3d. Find out idioms and phrases used in the given texts. TSO 3e. Write a short biography of the given writers. TSO 3f. Identify the figures of speech used in the given texts. TSO 3g. Classify the forms of poetry. TSO 3h. Elaborate the central idea / theme of the given poems in your own words.	3.1 An Astrologer's Day by R K Narayan 3.2 Indian Civilization and Culture by M K Gandhi 3.3 The Secret of Work by Swami Vivekanand 3.4 My Struggle for an Education by Brooker T Washington **Section-2 (Poetry)** 3.5 Where the Mind is without Fear by R N Tagore 3.6 Ode on Solitude by Alexander Pope 3.7 Stopping by Woods on a Snowy Evening by Robert Frost 3.8 A Psalm of Life by H W Longfellow	
TSO 4a. Form new words adding prefix and suffix to the given root words. TSO 4b. Write synonyms and antonyms of the given words. TSO 4c. Use the given idioms and phrases in your own sentences. TSO 4d. Distinguish between acronym and abbreviation. TSO 4e. Prepare a list of technical jargons of your respective branch. TSO 4f. Identify the parts of speech of the specific words in the given sentences. TSO 4g. Fill in the blanks with suitable verb forms in the given sentences. TSO 4h. Transform the given sentences as directed. TSO 4i. Punctuate the given paragraphs.	**Unit-4.0 Vocabulary and Grammar** 4.1 Word Formation: Prefix, Suffix, Acronym 4.2 Synonyms, Antonyms, Homonyms, One Word Substitution, Idioms and Phrases 4.3 Technical Jargons -Related to the respective program 4.4 Parts of speech 4.5 Time and Tense 4.6 Transformation: Voice, Narration, Removal of 'Too', Question Tag 4.7 Punctuation	**CO4, CO5**
TSO 5a. Write the precis of the given passage with suitable title. TSO 5b. Draft letters and applications for the given purpose. TSO 5c. Compose E-mails, Notices, Memos, and Circulars. TSO 5d. Prepare reports of the projects of your respective branch. TSO 5e. Write a report on the events organized in your institute.	**Unit-5.0 Professional Writing** 5.1 Precis Writing 5.2 Business Letters / Applications 5.3 Drafting E-mails, Notices, Memos, Circulars 5.4 Report Writing: Project and Event/ Incident Report Writing	**CO5**
Part -B (हिंदी) *TSO 1a* सम्प्रेषण कौशल का अर्थ स्पष्ट कर सकेंगे। *TSO 1b* भाव एवं सम्प्रेषण में अंतर बता पाएँगे। *TSO 1c* सम्प्रेषण की प्रक्रिया का उल्लेख कर सकेंगे। *TSO 1d* श्रवण अविव्यक्ति, वाचन और लेखन की अवधारणा को स्पष्ट कर सकेंगे। *TSO 1e* सम्प्रेषण कौशल के निर्धारक तत्वों का विवेचन कर सकेंगे। *TSO 1f* प्रभावशाली सम्प्रेषण के सिद्धांतों का समावेश अपने वार्तालाप में कर सकेंगे।	**Units-1.0: सम्प्रेषण सिद्धान्त एवं व्यवहार** 1.1 सम्प्रेषण : परिचय , अर्थ एवं परिभाषा 1.2 सम्प्रेषण की प्रक्रिया एवं तत्त्व 1.3 सम्प्रेषण के प्रकार : औपचारिक एवं अनौपचारिक, शाब्दिक एवं अशब्दिक 1.4 प्रभावशाली सम्प्रेषण के सिद्धांत एवं सम्प्रेषण व्यवधान कुरुक्षेत्र में श्रीकृष्ण- अर्जुन संवाद	**CO1, CO2, CO3**

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
	महाभारत युद्ध प्रारम्भ होने से पहले कुरुक्षेत्र में श्री कृष्ण ने अर्जुन के प्रश्नों के उत्तर देते हुए जीवन के सूत्र समझाए थे।ये उपदेश श्रीमद्भागव गीता में मिलते	
TSO 2a तकनीकी कौशल एवं व्यव्हार कौशल में अन्तर बता पाएँगे . TSO 2b व्यव्हार कौशल का म महत्व स्पष्ट कर पाएँगे . TSO 2c आत्मा जागरूकता एवं आत्मा विश्लेषण का विवेचन सोदाहरण कर पाएँगे . TSO 2d भावनात्मक बुद्धिमत्ता एवं करुणा, अनुकूलनशीलता एवं लचीलापन का विकास कर पाएँगे. TSO 2e दैनिक जीवन में अनुकूलनशीलता एवं लचीलापन को आत्मसात कर पाएँगे .	**Unit-2.0: व्यावसायिकउत्कृष्टता हेतु व्यव्हार कौशल** 2.1 परिचय : तकनीकी कौशल एवं व्यवहार कौशल 2.2 व्यवहार कौशल का महत्त्व 2.3 जीवन कौशल : आत्म जागरूकता एवं आत्म विश्लेषण 2.4 वनात्मक बुद्धिमत्ता एवं करुणा, अनुकूलनशीलता एवं लचीलापन, व्यवहार कौशल का उपयोग श्रीराम केवट संवाद श्रीराम जब लक्ष्मण और सीता के साथ वन गमन के लिए प्रस्थान करते हैं तब सरयू नदी के पार उतारने लिए केवट से अनुरोध करते हैं।	CO1
TSO 3aपठित गद्यांश एवं पद्यांश से प्राप्त नयी शब्दावली विकसित कर पाएँगे TSO 3b दिए गये कहानियों, कविताओं एवं निबंधों का सारांश अपने शब्दों में लिख पाएँगे. TSO 3c दिए गये कहानियों, कविताओं एवं निबंधों में प्रयुक्त मुहावरों एवं अलंकारों को बता पाएँगे . TSO 3d कविताओं का भावार्थ स्पष्ट कर पाएँगे .	**Unit-3.0: पाठ-बोध : शब्दावली परिवर्धन एवं व्याकरण अभ्यास** 3.1 नमक का दरोगा, ईदगाह – मुंशी प्रेमचंद 3.2 बात (निबंध)- प्रताप नारायण मिश्र 3.3 वह प्रदीप जो दिख रहा है झिलमिल दूर नहीं है – रामधारी सिंह दिनकर 3.4 नर हो न निराश करो मन को – मैथिलीशरण गुप्त 3.5 कबीर के दोहे -काल्ह करे सो आज कर , जाति न पूछो साधू की , ऐसी वाणी बोलिए	CO4
TSO 4a अपनी शाखा से सम्बन्धित तकनीकी शब्दावली का चयन कर पाएँगे . TSO 4b पर्यायवाची एवं विलोम शब्दों से सम्बंधित शब्दावली तैयार कर सकेंगे . TSO 4c दिये गये गद्यांशों में विराम चिह्नों का सही प्रयोग कर पाएँगे .	**Unit-4.0: शब्दावली एवं व्याकरण** 2 Hrs 4.1 सामान्य शब्दावली 4.2 प्रशासनिक शब्दावली 4.3 शब्द भेद, अनेक शब्दों के लिए एक शब्द 4.4 विराम चिन्ह 4.5 मुहावरें एवं कहावतें	CO4 CO5
TSO 5a दिए गये दिए गये गद्यांशों का संक्षेपण कर पाएँगे . TSO 5b विभिन्न प्रकार के पत्रों, आवेदनों ,सूचनाओं, विज्ञप्तियों को लिख पाएँगे . TSO 5c अपनी शाखा से सम्बंधित प्रतिवेदन लेखन कर पाएँगे . TSO 5d अपने संस्थान में हुए आयोजनों का प्रतिवेदन लिख पाएँगे.	**Unit-5.0: लेखन कौशल** 5.1 सार- लेखन 5.2 औपचारिक एवं व्यवसायिक पत्र लेखन 5.3 प्रारूप लेखन – सूचना, निविदा लेखन, प्रतिवेदन लेखन, बायोडाटा	CO5

Note: One major TSO may require more than one theory session/period.

K)   **Suggested Laboratory (Practical) Session Outcomes (LSOs) and List of Practical: P2400104** These practical's are common for both Part – A and Part -B.

Practical/Lab Session Outcomes (LSOs)		S. No.	Laboratory Experiment/Practical Titles	Relevant COs Number(s)
LSO1.a	Identify the emotions of the speakers.	1	Emotions of the speakers.	CO1
LSO2.a	Interpret instructions of audio transcripts.	2	Instructions of audio transcripts.	CO1
LSO3.a	Solve the language puzzles based on the audio transcript.	3	Language puzzles.	CO1
LSO4.a	Repeat words on language lab software after listening to them.	4	Repetition of words	CO1
LSO5.a	Summarize the excerpt in their own words.	5	Summarize the excerpt.	CO1
LSO6.a	Answer the questions based on the listening excerpt	6	Listening excerpt	CO2
LSO7.a	Differentiate the sounds of minimal pairs, syllables, words, etc.	7	Sounds of minimal pairs, syllables words etc.	CO2
LSO8.a	Pronounce the words/ sentences correctly based on the phonetic transcription.	8	Phonetic transcription.	CO2
LSO9.a	Read out the words and sentences based on stress and intonation marks.	9	Stress and intonation.	CO2
LSO10.a	Apply the paralanguage codes in verbal dialogues to show different emotions.	10	Paralanguage Codes	CO2
LSO11.a	Integrate the non-verbal codes in their verbal dialogues.	11	Non-verbal Codes	CO2
LSO12.a	Correct the verbal and non-verbal presentations of their peer while giving feedback.	12	Feedback on Presentations	CO2
LSO13.a	Differentiate the sounds of minimal pairs, syllables, words, etc.	13	Syllables and Words	CO2
LSO14.a	Locate the dictated words from the excerpt.	14	Dictated words	CO3
LSO15.a	Arrange the correct and logical sequence of the jumbled sentences.	15	Jumbled Sentences.	CO3
LSO16.a	Read the given texts aloud with proper pauses and proper pronunciation.	16	Pronunciation.	CO3
LSO17.a	Compare the point of view with their peers.	17	Point of view of Self and Peers	CO4
LSO18.a	Identify the main ideas of the excerpt	18	Main ideas of the excerpt	CO4
LSO19.a	Prepare a list of technical jargon and register specific to their program /industry.	19	Technical Jargons	CO5
LSO20.a	Write the specifications of the machines/ equipment available in the workshops/labs.	20	Specifications of the machines/ equipment	CO5
LSO21.a	Write a report on the projects of their respective branches.	21	Report on the Projects	CO5

J)   Theory Session Outcomes (TSOs) and Units: T2400105B

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
TSO 1a. Use standard forms of integration to find the integral of given simple functions. TSO 1b. Apply suitable Trigonometric transformation to solve a given Integration problem. TSO 1c. Solve given problems using the properties of the definite integral. TSO 1d. Invoke the concept of Integration to solve the problems based on the area and volume of irregular shapes.	**Unit-1.0 Integral Calculus and its Applications** 1.1 Concept of Integration. 1.2 Working rules and Integral of standard Functions. 1.3 Method of Substitution, Trigonometric transformation, Integration by parts and Partial fraction. 1.4 Applications: Area and volume.	**CO1**
TSO 2a. Express GCD of two numbers a,b into linear form ax+by TSO 2b. Find the solution of linear congruences. TSO 2c. Solve the system of congruences using the Chinese remainder theorem.	**Unit-2.0 Number Theory** 2.1 Euclid's division algorithm, GCD, LCM. 2.2 Prime numbers and Fundamental theorem of Arithmetic. 2.3 Congruences and Modular Arithmetic. 2.4 Chinese Remainder Theorem.	**CO2**
TSO 3a. Find the root of the given equation using Iterative methods up to the desired accuracy. TSO 3b. Calculate the root of given equations using the Newton-Raphson Method. TSO 3c. Apply the Newton-Raphson Method for engineering applications. TSO 3d. Solve problems using the Bakhshali iterative method for finding approximate square root. (IKS).	**Unit-3.0 Numerical Solution of Nonlinear Equations** 3.1 Algebraic and Transcendental equations. 3.2 Iterative Methods. 3.3 Newton-Raphson Method. 3.4 siterative method for finding the approximate square root. (IKS)	**CO3**
TSO 4a. Compute the rank of a Matrix. TSO 4b. Apply the Cayley-Hamilton theorem to find the Inverse of a Matrix. TSO 4c. Determine the Eigen values and Eigen vectors of a Matrix. TSO 4d. Differentiate between Linearly Independent and Dependent Vectors.	**Unit-4.0 Linear Algebra** 4.1 Rank of a Matrix. 4.2 Cayley-Hamilton Theorem. 4.3 Eigen values and Eigen vectors of a Matrix. 4.4 Linearly Independent and Dependent Vectors.	**CO4**
TSO 5a. Formulate given word problems into LPP. TSO 5b. Solve LPP by Graphical method. TSO 5c. Use the Simplex method to obtain the optimal value of a given LPP.	**Unit-5.0 Linear Programming** 5.1 Mathematical formulation of LPP. 5.2 Graphical method of solving LPP. 5.3 Simplex Method	**CO5**

K) Suggested Tutorials and Outcomes:

Outcomes	S. No.	Tutorials Titles	Relevant COs Number(s)
1.1 Calculate the area of the hexagon using integration. 1.2 Calculate the average temperature of a city over a certain period.	1.	• Area of irregular shape using integration. • Average value of a function using integration • Analysis of the performance of a diode	CO1

Outcomes	S. No.	Tutorials Titles	Relevant COs Number(s)
1.3 Measure the current-voltage characteristics of a semiconductor diode using integration. 1.4 Determine the total power consumed by an electrical device using Integration techniques. 1.5 Apply the concept of definite integration to find the volume.		through integration. • Calculation of power consumption using integration. • Volume of an irregular shape using integration.	
2.1 Use open-source software to generate random numbers with the help of modular arithmetic 2.2 Use Open-source software to solve combined modular equations. 2.3 Use the Fundamental Theorem of Arithmetic to check the divisibility of given numbers	2.	• Modular Arithmetic • Linear Congruences • Fundamental Theorem of Arithmetic	CO2
3.1 Use Newton's method to find the roots of a non-linear equation in one variable. 3.2 Use the concept of Newton's method to solve financial modeling-related problems based on the Black-Scholes model. 3.3 Calculate the electric field (that satisfies Maxwell's equations) around a wire with a given shape and current, using Newton Raphson's method. 3.4 Solve problems using the Bakhshali iterative method for finding approximate square roots. (IKS)	3.	• Applications of iterative techniques. • Application of Newton Raphson's method. • Iterative scheme using Newton's method. • Bakhshali iterative methods for finding the approximate value of square root. (IKS)	CO3
4.1 Use Matrix as a tool to code and decode given messages. 4.2 Use open source software to determine eigenvalues and Eigenvector of a given Matrix 4.3 Demonstrate Linearly independent and dependent vectors on GeoGebra	4.	• Coding and Decoding of messages using Matrix. • Eigen values and Eigen vectors using open-source software. • Linearly Independent and Dependent Vectors.	CO4
5.1 Model Industry based problems into an LPP problem 5.2 Use open-source software to solve an LPP problem by the Simplex method	5.	• Linear Programming Model. • Simplex Method.	CO5

L)   **Suggested Term Work and Self-Learning: S2400105B** Some sample suggested assignments, micro-projects, and other activities are mentioned here for reference.

     a. Assignments: Questions/Problems/Numerical/Exercises to be provided by the course teacher in linewith the targeted COs.

       1. Find the area of the region enclosed between two curves, also verify the obtained result geometrically using any open source software.

       2. Evaluate the Integral functions using open-source software and plot the Graph.

       3. Prepare a write-up on the relevance of prime factorization in cryptography, integer factorization, and secure key generation.

J)   Theory Session Outcomes (TSOs) and Units: T2400107

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
TSO 1a. Define concepts-values and ethics and attitude, development of attitudes *TSO 1b.* Identify situations depicting values such as humanity, honesty, punctuality, respect, peace, empathy *TSO 1c.* Identify situations depicting ethics, healthy competition, integrity, truthfulness,	**Unit-1.0 Values and Ethics in Day to Day Life** 1.1. Values- Definition and examples, Ethics- definition and examples, Concept of attitude and development of attitude 1.2. Importance of values and ethics in day to day activities and at workplace- Ethical ways of communication, environmental considerations in engineering processes, Basic concept of Carbon footprint, ethics at workplace 1.3. Examples of situations depicting values- based decisions and ethical behavior in day to Day life	**CO1**
TSO 2a. Identify the relevance of profession to society and environment *TSO 2b.* Identify the need of values and ethics in profession related activities *TSO 2c.* Identify Ethical conflicts	**Unit-2.0 Values and Ethics in Profession** 2.1 Relevance of profession to society 2.2 ethical principles such as respecting others and ourselves, respecting the rights of others, keeping promises, avoiding unnecessary problems to others, avoiding cheating and dishonesty, showing gratitude towards others and encouraging them to work 2.3 Identification of activities and related ethical and unethical behavior for professional activities in their area of work 2.4 Examples of situations depicting values- based decisions and ethical behavior	**CO1, CO2**

Note: One major TSO may require more than one Theory session/Period.

K)   Suggested Activities and Self-Learning: Reading books related to values and ethics/Epics/ Daily news and discussions in group

  a. Assignments: Preparation for group discussion, panel discussion, role play, case study, seminar, skits

  b. Micro Projects: Skits development and performance, poster making,

  c. Activities: Role Play, Case studies, Debates, Group Discussion,

  d. Suggested Seminar/ Debates on Topics such as:
    i.   charters of professions
    ii. Importance of Values and ethics in identified profession
    iii. Issues of ethical conflicts- Professional rivalry,
    iv. Identified issues from Chanakya Neeti
    v.   Ethics in scriptures such as Kabir ke Dohe etc.
    vi. Lessons on ethics from religious scriptures
    vii. Issued based on Happenings reported in Daily news

J)   Theory Session Outcomes (TSOs) and Units: T2400108

Major Theory Session Outcomes (TSOs)	Units	Relevant COs Number(s)
TSO 1a. Explain the architecture of the Ancient Indian Knowledge Systems. *TSO 1b.* List the salient features of IKS. *TSO 1c.* Comprehend the given IKS model. *TSO 1d.* Identify the role and relevance of the given IKS model in contemporary society.	**Unit-1.0 Introduction to Indian Knowledge Systems** 1.1 Overview of IKS 1.2 Organization of IKS – चतुर्दश-विद्यास्थानं 1.3 Conception and Constitution of Knowledge in Indian Tradition 1.4 The Oral Tradition 1.5 Models and Strategies of IKS	**CO1**
TSO 2a. Enlist the importance of Veda, Vedanga, Visaya, Siksaka. *TSO 2b.* Describe the given IKS domain. *TSO 2c.* Identify elements of mentioned IKS domains that are relevant to Technical Education System. *TSO 2d.* Correlate the elements of mentioned IKS domains with given engineering domain.	**Unit-2.0 Overview of IKS Domains and Relevance in Current Technical Education System** 2.1 The Vedas as the basis of IKS 2.2 Overview of all the six Vedāṅgas 2.3 Relevance of following IKS domains in present Technical Education System: • Arthashastra (Indian economics and political systems) • Ganita and Jyamiti (Indian Mathematics, Astronomy and Geometry • Rasayana (Indian Chemical Sciences) • Ayurveda (Indian Biological Sciences / Diet & Nutrition) • Jyotish Vidya (Observational astronomy and calendar systems) • Prakriti Vidya (Indian system of Terrestrial/ Material Sciences/ Ecology and Atmospheric Sciences) • Vastu Vidya (Indian system of Aesthetics-Iconography and built-environment /Architecture) • Nyaya Shastra (Indian systems of Social Ethics, Logic and Law) • Shilpa and Natya Shastra (Indian Classical Arts: Performing and Fine Arts) • Sankhya and Yoga Darshna (Indian psychology, Yoga and consciousness studies) • Vrikshayurveda (Plant Science / Sustainable agriculture/food preservation methods)	**CO1, CO2**

Note: One major TSO may require more than one Theory session/Period.

K) Suggested Laboratory (Practical) Session Outcomes (LSOs) and List of Practical: (Not Applicable)

L)   Suggested Term Work and Self Learning: Some sample suggested assignments, micro project and other activities are mentioned here for reference.