TULSIRAMJI GAIKWAD-PATIL College of Engineering & Technology

Mohgaon, Wardha Road, Nagpur - 441 108

Bachelor of Technology SoE and Syllabus 2025

(Department of Science and Humanities)

Vision of Institute

To emerge as a learning Center of Excellence in the National Ethos in domains ofScience, Technology and Management.

Mission of Institute

M1- To strive for rearing standard and stature of the students by practicing high standards of professional ethics, transparency and accountability.

M2- To provide facilities and services to meet the challenges of Industry and Society. M3- To facilitate socially responsive research, innovation and Entrepreneurship.

M4- To ascertain holistic development of the students and staff members by inculcating knowledge and profession as work practices.

TULSIRAMJI GAIKWAD-PATIL COLLEGE OF ENGINEERING & TECHNOLOGY
Wardha Road, Nagpur - 441108
Accredited with NAAC A+ Grade & NBA Accredited (EE, ME, CE & ECE)
Approved by AICTE, New Delhi, Govt. of Maharashtra
(An Autonomous Institution Affiliated to Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur)
Department of Basic Sciences and Humanities

Scheme of Instruction for First Year of B. Tech. (UG) Programme

Group-A Semester – I (AIML/CSE/DS/IT)

SN	Sem	Type	BoS/ Dept.	Sub. Code	Subject	T/P	Contact Hours				Credits	% Weightage				ESE Duration Hours
							L	P	SL	Hrs		CT/IA	CA	ESE	TOTAL	
FIRST SEMESTER (GROUP-A)																
1	1	**BSC**	**S&H**	BSH41101	Linear Algebra and Calculus	T	4	0	2	6	4	30	10	60	100	3
2	1	**BSC**	**S&H**	BSH41102	Quantum Physics & Optics	T	3	0	2	5	3	30	10	60	100	3
3	1	**BSC**	**S&H**	BSH41103	Quantum Physics & Optics-Lab	P	0	2	-	2	1	25	-	25	50	-
4	1	**ESC**	**ECE**	BEC41101	Digital Circuits and Design	T	3	0	2	5	3	30	10	60	100	3
5	1	**ESC**	**ECE**	BEC41102	Digital Circuits and Design –Lab	P	0	2	-	2	1	25	-	25	50	-
6	1	**ESC**	**CSE**	BCS41101	Programming for Problem Solving	T	2	0	2	4	2	15	5	30	50	1
7	1	**VSEC**	**CSE**	BCS41102	Programming for Problem Solving-Lab	P	0	2	-	2	1	25	-	25	50	-
8	1	**VSEC**	**S&H**	BSH41105	Professional Etiquette	P	0	2	-	2	1	25	-	-	25	-
9	1	**ESC**	**CSE**	BCS41103	Elements of AI –Lab	P	0	2	2	4	1	25	-	25	50	-
10	1	**AEC**	**S&H**	BSH41104	Digital Wellness & Basic Communication Lab	P	0	4	-	4	2	50	-	-	50	-
11	1	**CC**	**S&H**	BSH41X01	Liberal Learning Module-I	P	0	4	-	4	2	50	-	-	50	-
TOTAL FIRST SEM							**12**	**18**	**10**	**40**	**21**	**330**	**35**	**310**	**675**	**10**
SECOND SEMESTER (GROUP-A)																
1	2	**BSC**	**S&H**	BSH41201	Differential Equation and Statistics	T	4	0	2	6	4	30	10	60	100	3
2	2	**BSC**	**S&H**	BSH41202	Advance Material	T	3	0	2	5	3	30	10	60	100	3
3	2	**BSC**	**S&H**	BSH41203	Advance Material –Lab	P	0	2	-	2	1	25	-	25	50	-
4	2	**ESC**	**IT**	BIT41201	Logic Development and Programming Design	T	3	0	2	5	3	30	10	60	100	3
5	2	**ESC**	**IT**	BIT41202	Logic Development and Programming Design-Lab	P	0	2	-	2	1	25	-	25	50	-
6	2	**IKS**	**S&H**	BSH41204	Indian Ancient Technology	T	2	0	2	4	2	15	5	30	50	1
7	2	**ESC**	**ME**	BME41201	Idea & Innovation –Lab	P	0	4	-	4	2	50	-	-	50	-
8	2	**VSEC**	**IT**	BIT41203	Web Designing-Lab	P	0	2	-	2	1	25	-	25	50	-
9	2	**VSEC**	**S&H**	BSH41205	Social Internship	P	0	2	-	2	1	25	-	-	25	-
10	2	**PCC**	**IT**	BIT41204	Python Programing-Lab	P	0	4	-	4	2	25	-	25	50	-
11	2	**CC**	**S&H**	BSH41Y01	Liberal Learning Module-II	P	0	4	-	4	2	50	-	-	50	-
TOTAL SECOND SEM							**12**	**20**	**08**	**40**	**22**	**330**	**35**	**310**	**675**	**10**

Course Category	BSC/ESC (Basic Science Course/ Engineering Science Course.)	PCC (Programme Core courses)	Multidisciplinary courses	VSEC (Skill Course)	Social Science & Management		Experiential Learning Courses	CC (Co-Curricular Courses)
					AEC (Ability Enhancement Course)	IKS (Indian Knowledge System)		
Credits SEM-I	08 / 07	--	--	02	02	--	--	02
Credits SEM-II	08 / 06	02	--	02	--	02		02
Cumulative Sum	16 / 13	02	--	04	02	02	--	04

PROGRESSIVE TOTAL CREDITS: 21+22=43

				July, 2025	**4.00**	**Applicable for AY 2025-26 Onwards**
Chairperson	**Dean Academics**	**Vice Principal**	**Principal**	**Date of Release**	**Version**	

Scheme of Instruction for First Year of B. Tech. (UG) Programme
Group-A (AIML/CSE/DS/IT)

Liberal Learning Modules for SEM-I

SN	Sem	Type	BoS/ Dept.	Sub. Code	Subject	T/P	Contact Hours			Credits	Weightage		
							L	P	Hrs		INT (1-Certificate)	ESE (MCQ)	External Practical
1	1	CC	S&H	BSH41X01	Art of Theater	P	2	2	4	2	25	-	25
2	1	CC	S&H	BSH41X02	Fundamental of Music	P	2	2	4	2	25	-	25
3	1	CC	S&H	BSH41X03	CPD (Communication for Personality Development)	P	2	2	4	2	25	-	25
4	1	CC	S&H	BSH41X04	EBCD (Every Body Can Dance)	P	2	2	4	2	25	-	25
5	1	CC	S&H	BSH41X05	Yoga Practices & NSS	P	2	2	4	2	25	-	25
6	1	CC	S&H	BSH41X06	Interactive English (Level-1)	P	2	2	4	2	25	25	-
7	1	CC	S&H	BSH41X07	Gateway to Competitive Exams (Level-1)	P	2	2	4	2	25	25	-
8	1	CC	S&H	BSH41X08	Foreign Language -French (Level-1)	P	2	2	4	2	25	25	-
9	1	CC	S&H	BSH41X09	Foreign Language –German (Level-1)	P	2	2	4	2	25	25	-
10	1	CC	S&H	BSH41X10	Foreign Language –Japanese (Level-1)	P	2	2	4	2	25	25	-

Liberal Learning Modules for SEM-II

SN	Sem	Type	BoS/ Dept.	Sub. Code	Subject	T/P	Contact Hours			Credits	Weightage		
							L	P	Hrs		INT (1-Certificate)	ESE (MCQ)	External Practical
1	2	CC	S&H	BSH42Y01	Art & Craft	P	2	2	4	2	25	-	25
2	2	CC	S&H	BSH42Y02	Poster & Video Design	P	2	2	4	2	25	-	25
3	2	CC	S&H	BSH42Y03	IPD (Integrated of Personality Development)	P	2	2	4	2	25	25	-
4	2	CC	S&H	BSH42Y04	Sports (Outdoor & Indoor)	P	2	2	4	2	25	-	25
5	2	CC	S&H	BSH42Y05	Indian Cuisine	P	2	2	4	2	25	-	25
6	2	CC	S&H	BSH42Y06	Interactive English (Level-2)	P	2	2	4	2	25	25	-
7	2	CC	S&H	BSH42Y07	Gateway to Competitive Exams (Level-2)	P	2	2	4	2	25	25	-
8	2	CC	S&H	BSH42Y08	Foreign Language -French (Level-2)	P	2	2	4	2	25	25	-
9	2	CC	S&H	BSH42Y09	Foreign Language –German (Level-2)	P	2	2	4	2	25	25	-
10	2	CC	S&H	BSH42Y010	Foreign Language –Japanese (Level-2)	P	2	2	4	2	25	25	-

				July, 2025	4.00	Applicable for AY 2025-26 Onwards
Chairperson	Dean Academics	Vice Principal	Principal	Date of Release	Version	

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Program: B. Tech First Year Group-A (AIML/ CSE/ DS /IT)

Semester-I	**Linear Algebra & Calculus: BSH41101**				
Teaching Scheme		**Examination Scheme (Th)**		**Examination Scheme(P)**	
Theory (Th)	4 Hrs/week	**CT-I**	15 Marks	-	-
Practical (P)	-	**CT-II**	15 Marks	-	-
Total Credits	**4 (Th) = 4**	**CA**	10 Marks	-	-
Duration of ESE:3Hrs		**ESE**	60 Marks	-	-
		Total Marks	**100 Marks**	-	-

Pre-Requisites: NA

Course Objectives:

1	To identify algebraic problems from practical areas and obtain the solution in certain cases.
2	To expose students to understand the basic importance of Differential Calculus and Integral Calculus.
3	To understand different solution techniques of solving Beta and Gama Function and also understand solution of simultaneous equation by matrix method.
4	To apply your understanding of the concepts, formulas, and problem-solving procedures.
5	To analyze and apply properties of sequences and series, including their convergence and sums, in mathematical and real-world problems.

Unit I	**Matrices:** Introduction to rank of a matrix; Rank nullity theorem, Eigen values and Eigen vectors, Consistency of a system of equations, Cayley Hamilton Theorem, Sylvester's theorem
	Activity 1: Perform basic operations of matrices by Sagemath **Activity 2: Illustrate Eigen values and Eigen Vectors by Sagemath**
Unit II	**Differential Calculus:** Indeterminate Forms L'Hospital Rule, Taylor's and Maclaurin's series (for one variable), Maxima and Minima, Successive differentiation, Rolle's theorem, Lagrange's mean value theorem, Cauchy's mean value theorem
	Activity1: To Learn Calculus with SageMath **Activity 2: Differential Calculus and its Application by Sagemath**
Unit III	**Integral Calculus:** Introduction to Gamma Function & Properties of Gamma Function, Introduction to Beta Function & Properties of Beta Function, Relation between Beta & Gamma Function, Leibnitz's rule for differentiation under integral sign, Tracing of Cartesian and Polar curves
	Activity1: To trace the curve with Scilab **Activity 2: To trace the curve with Maple**
Unit IV	**Calculus of Function of several variables**: Differentiability of function of several variables, Partial Derivatives, Euler's theorem on homogeneous function, Implicit function, Jacobian and their applications, Chain Rule
	Activity1: To solve partial derivative by Sagemath
Unit V	**Sequence & Series:** Sequence, types of sequence, test of convergence of sequences, Cauchy sequence, infinite series, power series, Alternating series, tests of convergence and absolute convergence of series.
	Activity 1: Find the missing term based on logic or arithmetic rules

Chairperson

Text Books	
T.1	Higher Engineering Mathematics by Bali Lyenger (Laxmi Prakashan) 9th Edition
T.2	Advance Engineering Mathematics by Ervin Kreysizig's 9th Edition
T.3	H. K. Dass, Advanced Engineering Mathematics, S. Chand, Reprint, 2014.
T.4	Outline Series, McGraw Hills, 4th Edition, 2016.
T.5	P.N.Wartikar and J.N.Wartikar, Applied Mathematics, 4th Edition, Vidyarthi GrihaPrakashan.
T.6	GB Thomas and R.L. Finney, Calculus and Analytic geometry 9th edition, Pearson, Reprint2002.
Reference Books	
R.1	GilbertStrang: Linear Algebra and Its Applications (Paperback), Nelson Engineering (2007)
R.2	"Advanced Engineering Mathematics" by Erwin Kreyszig's (Wiley India) 9th edition
R.3	A textbook of Engineering Mathematics by N.P. Bali, Manish Goyal, Laxmi Publication, Reprint 2010
R.4	Higher Engineering Mathematics by B. S. Grewal, Khanna Publisher 35th edition.
Useful Links	
1	https://archive.nptel.ac.in/courses/111/108/111108157/
2	https://archive.nptel.ac.in/courses/111/104/111104144/
3	https://archive.nptel.ac.in/courses/111/104/111104092/

CO	Course Outcomes	CL	Class Sessions
CO1	**Implement** the concept of matrices to check existence of solution of system of linear Simultaneous equation.	3	9
CO2	**Apply** the concept of maxima, minima and successive differentiation in analysis of engineering problems.	3	9
CO3	**Solve** improper integrals using beta, gamma functions	3	9
CO4	**Use** of Partial differentiation to Solve Jacobian and Chain Rule	3	9
CO5	**Utilize** the concepts of sequences and series to address problems across mathematical and scientific domains	3	9

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Program: B. Tech First Year Group-A (AIML/ CSE/ DS /IT)

Semester-I **Quantum Physics & Optics (BSH41102)**

Teaching Scheme		Examination Scheme (Th)		Examination Scheme(P)	
Theory (Th)	3Hrs/week	**CT-I**	15 Marks	-	-
Practical(P)	2Hrs/week	**CT-II**	15 Marks	-	-
Total Credits	**3(Th)+1(P)=4**	**CA**	10 Marks	**CA**	25Marks
Duration of ESE:3Hrs			60 Marks	**ESE**	25Marks
		Total Marks	**100 Marks**	-	**50Marks**

Pre-Requisites: AICTE Bridge Course, Basics of Physics.

Course Objectives:

1. To explain the concept of wave particle duality, wave packet through the De-Broglie hypothesis and Heisenberg uncertainty Principle and types of optical fiber with their application.
2. To interpret the motion of charged particle in electric field, magnetic field and cross configured field through Bethe's law , Cathode ray tube (CRT) and Cathode ray Oscilloscope(CRO).
3. To analyze the concept of cut in voltage, voltage regulator and current gain in PN junction diode, Zener diode and transistor respectively.
4. To compare the interference in parallel and wedge-shaped thin film and their application in engineering field.
5. To explain the characteristics, properties of laser with their application in engineering and medical field.

Course Contents

Unit I	**Quantum Mechanics & Optical fiber:** The wave particle duality of light, The De-Broglie Hypothesis, Wave packet, Phase and group velocity, Heisenberg Uncertainty Principle and its application. Propagation of light by total internal reflection, structure and classification, Modes of propagation in fiber, Applications of Optical fiber.
	Activity 1: Game Pedagogy - Crossword Puzzle based on quantum mechanics/optical fiber **Activity 2: Open Book Test**
Unit II	**Electron Ballistics and Electron Optics:** Introduction of electric and magnetic field, Uniform Electric Field parallel to electron motion, Uniform Electric Field perpendicular to electron motion, Uniform Magnetic Field parallel to electron motion, Uniform Magnetic Field perpendicular to electron motion, Electric and Magnetic fields in cross configuration, Bethe's law, Devices: Cathode Ray tube, CRO, Block Diagram, Function & working of each block.
	Activity 1: PPT on classification of Cathode ray tube and Cathode ray oscilloscope with their Application **Activity2: Multiple choice questions on Electron Ballistics and Electron Optics.**
Unit III	**Semiconductor Physics**: Introduction, Intrinsic semiconductors and Extrinsic Semiconductor, PN- junction diode, Zener diode, LED, Hall effect & voltage, Hall coefficient, its application, Transistor (CB, CC&CE mode).
	Activity 1: Circuit model making of Pn Junction Diode/ light emitting diode/ Zener diode/Transistor. **Activity 2: : Case Study on Semiconductor Material & its Application.**

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Unit IV	**Interference In Thin Film:** Introduction, thin film, Plane Parallel thin film, Wedge shaped thin film, Newton rings, Antireflection coating.
	Activity 1: Context based learning & document making based activity. **Activity 2: Preparation of Video clips / Build model**
Unit V	**Laser:** Introduction of Laser and its characteristics, Interaction of radiation with matter, Meta stable state, Active Medium, Condition of Light amplification, Population Inversion, pumping, Three and four level laser, Ruby laser, Properties and engineering applications.
	Activity 5: Poster Presentation.

Text Books	
T.1	Avadhanulu, M.N., & Kshirsagar, P.G. (8th Revised Edition). A Textbook of Engineering Physics. S. Chand Publication. New Delhi.
T.2	Subrahmanyam, N., Brij Lal, & Avadhanulu, M.N. (23rd Revised and Enlarged Edition, 2006). A Textbook of Optics. S. Chand Publication. New Delhi.
T.3	Mehta, V.K., & Mehta, Rohit. (Multicolour Illustrative and Thoroughly Revised Tenth Edition, 2006). Principles of Electronics. S. Chand Publication. New Delhi.
Reference Books	
R.1	Theraja, B.L. (Reprint 2nd Edition). Modern Physics. S. Chand & Co. New Delhi.
R.2	Dekker, J. (Reprint 1st Edition). Solid State Physics. McMillan India Ltd. Mumbai.
Useful Links	
1	https://nptel.ac.in/courses/115/102/115102124/
2	https://nptel.ac.in/courses/115/106/115106128/
3	https://nptel.ac.in/courses/104/101/104101130/

LIST OF EXPERIMENTS (Quantum Physics & Optics-Lab: BSH41103)		
1	Determination of acceptance angle and numerical aperture using optical fiber kit.	CO1
2	Determination of e/m ratio of an electron by Thomson method .	CO2
3	Determination of ripple factor and rectification efficiency by Half Wave and Full Wave Rectifier with CRO.	CO2
4	Determine the Cut in Voltage and Dynamic Resistance of P-N Junction Diode in Forward and Reverse Biased	CO3
5	Determine the Break Down Voltage and Dynamic Resistance of Zener Diode.	CO3
6	Determination of Dynamic Resistance and Current Gain of Transistor in Common Base Mode..	CO3
7	Determination of Dynamic Resistance and Current Gain of Transistor in Common Emitter	CO3
8	Determination of the Wavelength of Sodium Light By Using Newton rings experiment.	CO4
9	Determination of Fringe width by using Wedge shaped thin film.	CO4
10	Determination of divergence of laser beam.	CO5

Text Books	
T.1	Avadhanulu, M.N., & Dani, A.A. (2007). Experiments in Engineering Physics (2nd ed.). S. Chand & Company Ltd.
T.2	A textbook of Practical Physics: Samir Kumar Ghosh,1st Edition, New Central Book Agency, Kolkata.
Reference Books	
R.1	Engineering Physics: Dattu Joshi,Tata McGraw Hill Education, New Delhi.
R.2	A text book of Engineering physics: Dr.M.N.Avadhanulu, Dr. P.G.Kshirsagar, S.Chand Publication.

Chairperson

Useful Links	
1	https://nptel.ac.in/courses/115/106/115106128/
2	https://nptel.ac.in/courses/104/101/104101130/

CO	Course Outcomes	CL	Class Sessions
CO1	**Interpret** the behavior of wave particle duality, wave packet and mode of propagation of light in optical fiber with their quantum application.	3	9
CO2	**Illustrate** the concept of motion of charged particle in electric field, magnetic field and cross configured field..	3	9
CO3	**Explain** PN junction diode, Zener diode, Light emitting diode and transistor with their application in engineering field.	4	9
CO4	**Differentiate** interference phenomenon in parallel and wedge-shaped thin film and their application in engineering field.	4	9
CO5	**Explain** the characteristics of laser and their application in engineering.	4	9

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Program: B.Tech First Year Group-A(AIML/CSE/DS/IT)

Semester-I	**Digital Circuits and Design (BEC41101)**				
Teaching Scheme		**Examination Scheme(Th)**		**Examination Scheme(P)**	
Theory(Th)	3Hrs/week	**CT-I**	15 Marks	-	-
Practical(P)	2Hrs/week	**CT-II**	15 Marks	-	-
Total Credits	**3(Th)+1(P) =4**	**CA**	10 Marks	**CA**	25Marks
Duration of ESE:3Hrs		**ESE**	60 Marks	**ESE**	25Marks
		Total Marks	**100 Marks**	-	**50 Marks**

Pre-Requisites: Bridge Course

Course Objectives:

1.	To understand different number systems such as Binary, Decimal, Octal, and Hexadecimal.
2.	To develop and analyze logical expressions and circuits using logic gates, Boolean algebra, and Karnaugh Maps.
3.	To impart knowledge of fundamental combinational logic circuits such as adders, subtractors, multiplexers, encoders, and decoders.
4.	To understand the working principles and types of flip-flops used in sequential circuit design and their role in memory elements.
5.	To introduce various types of counters and shift registers, and their application in digital timing and display systems.

Course Contents

Unit I	**Number system:** Binary, Decimal, Octal & Hexadecimal, Conversion of one number system to another, BCD number system, Addition & Subtraction of Binary number system, 1's complement, 2's Complement
	Activity 1: MCQ Test/ Digital Number System Conversion Race
Unit II	**Logic Gates**: Symbol & truth table of AND gate, OR gate, NOT gate, NAND gate, NORgate, Ex- OR, Ex-NOR Gate, Laws of Boolean algebra, De-Morgan's theorem, POS,SOP, Minterm, Maxterm and Karnaugh Maps (K-map)
	Activity 2: Game Pedegogy
Unit III	**Combinational Logic circuits:** Introduction, Half adder, Full adder, Half subtractor, Full subtractor circuit. Multiplexer andDE-multiplexer, Encoder & Decoder
	Activity 3: Technical Poster Presentation
Unit IV	**Flip Flops:** R-S Flip-Flop, J-K Flip-Flop, Master–Slave Flip-Flops, D Flip-Flop, J-K Flip-Flop as D Flip-Flop , T- Flip-Flop
	Activity 4: Mind Mapping/Open Book Test
Unit V	**Counter:** Introduction, Asynchronous counter, Synchronous counter, Bushing, Type T Design, Ring counter & Johnson counter **Shift Register:** Introduction, parallel and shift register, Seven Segment displays.
	Activity 1: Story Board Writing/ Paper Presentation

Text Books

T.1	Electronic Devices and Circuits David A Bell
T.2	Digital Logic and Computer Design M.Morris Mano, PHI Learning.

Reference Books

R.1	Electronics Instrumentation and Measurements (3rdEdition) – David A. Bell.
R.2	Fundamental of digital circuits by A. ANAND KUMAR

Chairperson

Useful Links	
1	https://nptel.ac.in/courses/122106025
2	https://nptel.ac.in/courses/108105132
3	https://nptel.ac.in/courses/117104072

Sr.No.	List of Experiment	CO
1	Design different logic gates and verify its truth table.	**CO1**
2	Design universal gates and verify its truth table.	**CO1**
3	Design Half Adder and Full Adder and verify its truth table.	**CO2**
4	Design Half Sub tractor and Full Sub tractor and verify its truth table.	**CO2**
5	Verify proof of De-Morgan's theorem Boolean algebra with its truth table	**CO3**
6	Design 4:1 multiplexer and 1:4 demultiplexer and verify its truth table.	**CO3**
7	Design 8:3 encoders & 3:8 decoder logic circuits and verify its truth table.	**CO4**
8	Design different flip-flops and verify its truth table.	**CO4**
9	Design of 3 bit synchronous counter and verify its truth table.	**CO5**
10	Design of shift register and shift register counter and verify its truth table.	**CO5**

Text Books	
T.1	A Text Book of Modern Digital Electronics by R.P.Jain:Mc Graw Hill
T.2	Digital Electronics: Principles, Devices and Applications by Anil K. Maini, Mc Graw Hill
Reference Books	
R.1	E. Hughes, "Electrical and Electronics Technology",Pearson,2023.
R.2	Digital Logic and Computer Design by M.Morris Mano: Pearson

CO	Course Outcome	CL	Class Session
CO1	**Summarize** the number system & its conversion	2	9
CO2	**Interpret** the truth table of Logic gates and simplify its logical expression	2	9
CO3	**Implement** combinational logic circuit by using half and full adder.	3	9
CO4	**Illustrate** the functional behavior of flip-flops	3	9
CO5	**Apply** the working principles of asynchronous and synchronous counters	3	9

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Program: B. Tech First Year Group-A (AIML/ CSE/ DS /IT)

Semester-I **Programming for Problem Solving using 'C': BCS41101**

Teaching Scheme		Examination Scheme(Th)		Examination Scheme(P)	
Lectures	2 Hrs/week	**CT-1**	07 Marks	-	-
Practical	4 Hrs/week	**CT-2**	07 Marks	-	-
SL	1 Hrs/week	**TA**	06 Marks	**CA**	25Marks
Total Credits	**2(Th)+4(P) = 4**	**ESE**	30 Marks	**ESE**	25Marks
Duration of ESE:2Hrs		**ESE**	**Total**	-	-
		Total Marks	**50Marks**	-	**50Marks**

Pre-Requisites: NA

Course Objectives:

1.	To understand the basics, history, and structure of the C programming language.
2.	To Apply control structures like decision-making, loops, and unconditional statements to solve programming problems.
3.	To describe the techniques for creating program modules in C using Array and Pointer

Course Contents

Unit I	**Introduction to C:** History of C, Features of C, Structure of C program, Character Set, C Tokens- Keywords, Identifiers, Constants, Variables, data types, Operators, variable declaration, Assigning Value to variable, Introduction to Computing: Algorithm, Flowchart, Representation of Algorithm and Flowchart with examples. **Operator and Expression:** Arithmetic, Relational, Logical, Assignment, Increment and Decrement, Conditional operator, Bitwise operators, sizeof operator, Arithmetic Expression, Evaluation expression. Expressions, Precedence and Associativity, Expression Evaluation, Type conversion, typedef, enum.
	Activity: **1) Write and Submit a Flowchart & Algorithm** **2) Create a C Program with All Basic Tokens**
Unit II	**Programming Basics**: Components of C language. Standard I/O in C, Format Specifies, Writing and executing C program, Syntax and logical errors in compilation, object and executable code. **Control Structures**: Selection Statements (Decision Making) – if and switch statements. **Statements (Loops)**: while, for, do-while statements, Unconditional Statements – break, continue, goto with Example.
	Activity: 1) Debugging Challenge **2) Conditional Control Flow Mini Project**
Unit III	**Basic Arrays:** Definition, declaration of array, Initialization, storing values in array. **Type of Array**: Two dimensional arrays, Multi-dimensional arrays. Arrays and Pointers, Array of pointers **Basics of Algorithm:-** Introduction, Types of algorithm, Sorting Algorithm, Bubble & Insertion sort.
	Activity: **1) 2D Array Matrix Operations** **2) Sorting Visual Report**

Text Books

T.1	Computer Programming with C, Special Edition-MRCET, Mc Graw Hill Publishers 2017.
T.2	Computer Science: A Structured Programming Approach Using C, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning.

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Reference Books	
R.1	Let us C ,Yashwanth Kanethkar, 13th Edition, BPB Publications.
R.2	Computer Programming, E.Balagurusamy, First Edition, TMH.
R.3	The C Programming Language, B.W. Kernighan and Dennis M.Ritchie, PHI.
Useful Links	
1	https://youtu.be/-wv-OERJK3M
2	https://youtu.be/IdXrCPzNnkU
3	https://youtu.be/5AHRXOtn9bY

Sheet No.	List of Experiments (Programming for Problem Solving using 'C' Lab: BCS41102)	
1	Execute a program to swap two variables values with and without using third variable	CO1
2	Implement a Program that include all the arithmetic operator.	CO1
3	Write a program to to find the greatest among three number using if-else.	CO2
4	Design a program using Loops and print the following star pattern. * * * * * * * * * *	CO2
5	Implement a program using array and contract two matrix of 3*3 and store the sum in resultant matrix.	CO3
6	Develop a program to swap a values of a variable using pointers.	CO3
7	Implement a program that include bubble sort.	CO3
8	Micro Project Based on Programming.	CO3

CO	Course Outcomes	CL	Class Session
CO1	**Understand** the use of algorithms and flowchart to represent computational logic	2	9
CO2	**Apply** the concept of subprograms and Loops for programming.	3	8
CO3	**Use** arrays, multidimensional arrays and array of pointers in C.	3	8

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(An Autonomous Institution Affiliated to Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur)
Department of Basic Sciences and Humanities

Program: B. Tech First Year Group-A (AIML/ CSE/ DS /IT)

Semester-II **Professional Etiquette : BSH41105**

Teaching Scheme		Examination Scheme(Th)		Examination Scheme(P)	
Theory (Th)	-	**CT-I**	-	-	-
Practical (P)	2 Hrs/week	**CT-II**	-	-	-
Total Credits	**2 (P)**	**CA**	-	-	25 marks
Duration of ESE:-		**ESE**		-	-
		Total Marks	**Marks**	-	**25 Marks**

Pre-Requisites:

Course Objectives:

1. To list key elements of personal grooming & dressing etiquettes
2. To describe the characteristics and implications of various mindsets.
3. To differentiate between professional and unprofessional behaviors in various academic and social contexts.

Course Contents

Unit I	**Personal Grooming & First Impression** Dressing Etiquette, Personal Cleanliness, Table Manners, Conversational Etiquette, Small Talk, Active Listening, Interruptions, Eye Contact, Smile, Handshake
	Activity : 1. Role play For meeting someone for the first time 2. Demonstration for table manners at a professional dinner.
Unit II	**Introduction to Habit Formation & Soft Skills** Meaning & Importance of Professional Etiquette & Soft Skills , Day to Day Manners, Definitions and Types of Mindset, Developing Learning Mindset & Growth Mindsets, Planning And Goal-Setting, Introduction to Habit Formation, Identifying various habits, Habit Cycle: Breaking Non-Productive Habits ,Using The Zeigarnik Effect For Productivity And Personal Growth, Developing Habits Of Success
	Activity : 1. Prepare a personal goal vision board 2. Identification of productive habits & non-productive habits through a worksheet
Unit III	**Workplace Manners** Meeting, Introduction at Meetings , Digital Etiquette, Workplace Ethics , Email Etiquette
	Activity :1.Writing a formal email 2.Case Study for understanding the real life scenario

Text Books

1	The Essentials of Business Etiquette by Barbara Pachter, McGraw Hill Education
2	Soft Skills- Enhancing Employability, M. S. Rao, I. K. International

Reference Books

1	Seven Habits of Highly Effective People by Steven Covey
2	You Can Win by Shiv Khera
3	Corporate Soft Skills by Sarvesh Gulati

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Useful Links	
1	https://nptel.ac.in/courses/109104107
2.	https://youtu.be/PuMX30xZktE?feature=shared

Sheet No.	List of Experiments	
1	To understand the importance of first impressions through grooming, dress, and body language.	CO1
2	To demonstrate proper table manners in a formal professional setting.	CO1
3	To develop non-verbal communication skills through eye contact and active listening	CO1
4	To visualize personal and professional goals through the creation of a vision board.	CO2
5	To identify and analyze productive and non-productive habits.	CO2
6	To understand the impact of mindset on learning and personal growth	CO2
7	To plan and manage time effectively through goal-setting and habit tracking.	CO2
8	To practice professional communication skills through formal email writing.	CO3
9	To analyze workplace scenarios for ethical behavior and decision-making.	CO3
10	To understand digital etiquette in professional online communication.	CO3

CO	Course Outcomes	CL	Class Sessions
CO1	**Understand** the key elements of personal grooming and appropriate dressing etiquette for academic and professional environments.	2	8
CO2	**Formulate** a personalized action plan for developing a growth mindset, setting realistic academic goals, and adopting positive habits for self-improvement.	3	8
CO3	**Demonstrate** between professional conduct across academic, social and virtual setting throw role play and discursion.	4	9

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Program: B. Tech First Year Group-A (AIML/ CSE/ DS /IT)

Semester-I	**Elements of AI –Lab (BCS41103)**				
Teaching Scheme		**Examination Scheme(Th)**		**Examination Scheme(P)**	
Theory(Th)	-	**INT**	-	-	-
Practical (P)	4Hrs/week	**ESE**	-	-	-
Total Credits	**2(P)**	**CA**	-	-	25 Marks
Duration of ESE: 2Hrs		**ESE**		-	25 Marks
		Total Marks		-	**50 Marks**

Pre-Requisites: NA

Course Objectives:

1.	Define and explain basic concepts and applications of AI.
2.	Demonstrate simple machine learning models using AI tools.
3.	Discuss ethical aspects and future impact of AI on society.

Course Contents

UnitI	**Introduction to Artificial Intelligence:** French What is AI? Definitions and Goals, History and Evolution of AI, Applications of AI in daily life: Healthcare, Education, Agriculture, Robotics, and Types of AI: Weak AI, Strong AI, General AI.
	Activity 1. Complete a 5-question quiz on types and history of AI **Activity 2.** Group discussion: "Where do we see AI today?"
UnitII	**Machine Learning Basics and Tools:** What is Machine Learning? Types of Machine Learning: Supervised, Unsupervised, and Simple tools: Google Teachable Machine, Scratch AI blocks, Python basics.
	Activity 1. Draw a diagram showing how Machine Learning works–Input→Processing→Output. **Activity 2.** Crack the ML Code – Crossword Challenge
UnitIII	**AI Applications, Ethics & Future Scope:** AI in Robotics, Smart Assistants, Social Media, Ethics in AI: Bias, Privacy, and Job Impact, Responsible use of AI, and Future of AI: Opportunities and Challenges
	Activity 1. Debate: "Will AI take our jobs?" **Activity 2.** Mini project idea discussion

Text Books

T.1	*Elaine Rich, Kevin Knight, Shivashankar B Nair* – Artificial Intelligence – *McGraw Hill, 3rd Edition*
T.2	*Stuart Russell, Peter Norvig* – Artificial Intelligence: A Modern Approach – *Pearson Education, 4th Edition*
T.3	*Anandita Das Bhattacharya* – Introduction to Artificial Intelligence – *Cengage Learning*

Reference Books

R.1	**John Haugeland** – *Artificial Intelligence: The Very Idea* – MIT Press
R.2	**Tom Taulli** – *Artificial Intelligence Basics: A Non-Technical Introduction* – Apress
R.3	**Diane Cook, Narayanan Krishnan** – *Activity Learning from Sensor Data* – Wiley

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Useful Links	
L.1	**Google Teachable Machine**: https://teachablemachine.withgoogle.com/
L.2	**Scratch AI Blocks** (with ML extensions): https://llk.github.io/scratch-ai/
L.3	**Elements of AI**: https://www.elementsofai.com

LIST OF EXPERIMENTS		
1	Identify and understand various real-life applications of Artificial Intelligence in diverse fields such as healthcare, agriculture, education, and transportation.	CO1
2	Explore the definition and concept of Artificial Intelligence using AI tools and summarize the findings in simple terms.	CO1
3	Analyze public perception and trust in AI by conducting a small-scale survey and interpreting the results.	CO1
4	Discuss and document current areas where AI technologies are actively used in daily life and industries.	CO2
5	Investigate and present the future possibilities and developments in Artificial Intelligence through a structured presentation.	CO2
6	Creatively engage with AI by generating and presenting a literary piece (story, poem, or rap) using AI Application.	CO2
7	Develop and answer a basic quiz on AI concepts, enhancing fundamental understanding through interactive learning.	CO3
8	Learn how to draft a professional resume for AI-related opportunities using AI-generated content and formatting tips.	CO3
9	Ideate and propose a real-world mini project that integrates AI solutions in domains like agriculture, education, or library systems.	CO3
10	Conceptualize and design a virtual AI assistant by detailing its name, functionality, features, and areas of application.	CO3

CO	Course Outcomes	CL	Class Sessions
CO1	**Understand** basic concepts, history, and real-life applications of Artificial Intelligence.	2	8
CO2	**Describe** the fundamental concepts, historical evolution, and significant real-life applications of Artificial Intelligence.	2	8
CO3	**Explore** ethics, societal impact, and future challenges and AI development	3	9

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SEMESTER-I	**Digital Wellness & Basic Communication Lab - BSH41104**				
Teaching Scheme		**Examination Scheme (Th)**		**Examination Scheme (P)**	
Theory (Th)	-	**CT-I**	--	-	-
Practical (P)	4 Hrs./ Week	**CT-II**	--	-	-
Total Credits	**2 (P)**	**CA**	--	**CA**	25 Marks
Duration of ESE: --		**ESE**	--	**ESE**	25 Marks
		Total Marks	--	--	**50 Marks**

Pre-Requisites:-

Course Objectives:-

1.	To introduce the concept of digital wellness and its importance in modern life.
2.	To train students in using digital tools responsibly and maintaining mental health in digital environments.
3.	To develop an understanding of effective communication in professional settings.
4.	To develop written and oral communication skills for business contexts.
5.	To enable students to present themselves professionally in online and offline environments.

Course Contents

Unit-I	**The Basics of Digital Wellness –** Introduction to Digital Wellness, Attention, Distraction, Principles and Practices from Yoga Philosophy, Techniques for developing Attention through Yoga, Difference between Stimulation and Relaxation, Attention Enhancers.
Unit-II	**Science of Addiction and De-addiction** – Habits and Addiction, Harnessing the Power of Neuroplasticity, Science and the Benefits of Physical Exercise.
Unit-III	**Digital Detox –** Techniques of Digital Detox, Seven-week Digital Wellness Plan, Digital Screens and Eye Health in Children.
Unit-IV	**Introduction to Business Communication** - Definition, types, and significance 7 C's of effective Communication, Barriers to communication and overcoming them, Verbal vs non-verbal Communication.
Unit-V	**Written and Oral Communication**- Email writing (professional emails), Report writing and Proposals, Business letters and memos, Resume and cover letter writing, Presentation skills, Public speaking and group discussions, Interviews (mock interviews), Meeting etiquettes.

Text Books:-

T1.	"Digital Wellness" publish Brahma Kumaris by Prajapita Vishwa Vidyalaya, Pandav Bhawan. Mount Abu, Rajasthan
T2.	"Business Communication" by Peter Hartley and Clive G. Bruckmann
T3.	"Business English for Success" by Scott McLean

Reference Books:-

R1.	Adair, John. Effective Communication. London: Pan Macmillan Ltd., 2003.
R2.	Carnegie, Dale. The Quick and Easy Way to Effective Speaking. New York: Pocket Books, 1977.
R3.	Guffey, Mary Ellen. Essentials of Business Writing. Ohio: South Western College Pubg., 2000.

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Useful Links:-	
1.	https://www.brahmakumaris.com/digital-wellness
2.	https://www.youtube.com/watch?v=8eLjttXORIs

LIST OF EXPERIMENTS (Digital Wellness & Basic Communication Lab - BSH41104)		
1	Introduction to Digital Wellness: A Study on Attention and Distraction	**CO1**
2	Enhance the Attention through Yoga	**CO1**
3	Habits and Addiction – Harnessing the Power of Neuroplasticity	**CO2**
4	Challenge of Digital Detox	**CO2**
5	Comparison Between Digital Reading and Print Reading	**CO3**
6	Create a Personal Digital Wellness Plan	**CO3**
7	Explore and build the Foundations for Better Communication	**CO4**
8	Navigate from Barriers to Bridges	**CO4**
9	Mastering Business Writing Skills	**CO5**
10	Develop Professional Communication Competence	**CO5**

CO	Course Outcomes	CL	Class Sessions
CO1	**Identify** the awareness of digital wellness principles and implement best practices	1	4
CO2	**Explain** professionalism and etiquettes in physical and virtual workspaces.	1	4
CO3	Summarize digital tools for productivity and effective professional communication	2	4
CO4	**Understand** key concepts of business and digital communication	2	4
CO5	**Apply** appropriate written and oral communication strategies in a business setting	3	4

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Semester-II **Differential Equation & statistics: (BSH41201)**

Teaching Scheme		Examination Scheme (Th)		Examination Scheme(P)	
Theory (Th)	4Hrs/week	**CT-I**	15 Marks	-	-
Practical (P)	-	**CT-II**	15 Marks	-	-
Total Credits	**4(Th) = 4**	**CA**	10 Marks	-	-
Duration of ESE:3Hrs		**ESE**	60 Marks	-	-
		Total Marks	**100 Marks**	-	-

Pre-Requisites: NA

Course Objectives:

1	To utilize consistency of system of equations.
2	To make students acquainted with advance techniques to evaluate integrals.
3	Identify the type of a given differential equation and select and apply the appropriate analytical Technique for finding the solution of first order and selected higher order ordinary differential equations.
4	To gain Statistical knowledge that helps to use the proper methods to collect the data, employ the Correct analyses and find the result.
5	To introduce students to Discrete and Continuous Random Variables concepts and their use in real world phenomena.

Unit I	**Differential Equation**: Order and Degree of D.E, Linear and Exact Differential Equations, First order & First degree D.E. solvable for p, Equations solvable for y, Equations solvable for x, Application : Newton's law of cooling, Data Analysis through Programming.
	Activity 1. Mathematically Verification of Newton's law of Cooling Practically. **Activity 2. To solve Linear Differential Equation by Sagemath.**
Unit II	**Higher Order Differential Equation**: Higher order linear D.E. with constant coefficient, Method of variations of Parameters, Cauchy's form, Legendre's Linear Equations. Application of second order differential equation to R-L-C CIRCUIT, Heat Equations.
	Activity 1. Perform basic operations of Differential equation by Sagemath. Activity 2. To solve higher Order Differential Equation by using Sagemath
Unit III	**Multivariable Calculus (Integration)**: Double Integration (Cartesian and polar coordinates), Change of Order of Integration, Elementary Triple Integration, And Application: Area by double integration and volume by triple integration.
	Activity 1. Application of integration by using Sagemath Activity 2. Evaluation of Integration by using Sagemath.
Unit IV	**Probability**: Conditional Probability, Discrete Random Variable, Continuous Random Variable, Probability Distribution function, Probability density function, Binomial Distribution ,Uniform Distribution, Poisson's Theorem, Moment Generating Function (Discrete random Variable and Continuous Random variable).
	Activity 1. Mathematical model based on Probability. **Activity 2. To Evaluate Random variable by using Sagemath.**
Unit V	**Statistics**: Measures of central tendency: Skewness and Kurtosis, Coefficient of variation, Moments, Fitting of straight line, Fitting of parabola and exponential curves, Lines of regression and correlation, Rank correlation.
	Activity 1. To Determine mean, mode & median by sagemath. **Activity 2. To Fit the straight line , Parabola and Exponential curves by using Scilab.**

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Text Books	
T.1	Higher Engineering Mathematics by Bali Lyenger (Laxmi Prakashan) 9th Edition
T.2	Advance Engineering Mathematics by Ervin Kreysizig's 9th Edition
T.3	H. K. Dass, Advanced Engineering Mathematics, S. Chand, Reprint, 2014.
T.4	Outline Series, McGraw Hills, 4th Edition, 2016.
T.5	P.N.Wartikar and J.N.Wartikar, Applied Mathematics, 4th Edition, Vidyarthi GrihaPrakashan.
T.6	GB Thomas and R.L. Finney, Calculus and Analytic geometry 9th edition, Pearson, Reprint2002.
Reference Books	
R.1	Gilbert Strang: Linear Algebra and Its Applications (Paperback), Nelson Engineering (2007)
R.2	"Advanced Engineering Mathematics" by Erwin Kreyszig's (Wiley India) 9th edition
R.3	A textbook of Engineering Mathematics by N.P. Bali, Manish Goyal, Laxmi Publication, Reprint 2010
R.4	Higher Engineering Mathematics by B. S. Grewal, Khanna Publisher 35th edition.
Useful Links	
1	https://onlinecourses.nptel.ac.in/noc23_ma61/preview
2	https://onlinecourses.nptel.ac.in/noc21_ma74/preview
3	https://archive.nptel.ac.in/courses/111/107/111107108/

Course Code	Course Outcomes	CL	Class Sessions
CO1	**Use** appropriate methods to solve first order differential equation and apply it to find solution of engineering problems.	3	9
CO2	**Apply** appropriate methods to solve higher order differential equation	3	9
CO3	**Utilize** fundamental theorems to compute integrals of both single-variable and multivariable functions.	3	9
CO4	**Apply** Probability concepts to interpret real- world Phenomena.	3	9
CO5	**Illustrate** correlation and regression in scientific data using curve fitting technic.	3	9

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Semester-II	**Advance Material: BSH41202**				
Teaching Scheme		**Examination Scheme(Th)**		**Examination Scheme(P)**	
Theory (Th)	3 Hrs/week	**CT-I**	15 Marks	-	-
Practical (P)	2 Hrs/week	**CT-II**	15 Marks	-	-
Total Credits	**3 (Th)+1 (P)=4**	**CA**	10 Marks	**CA**	25 Marks
Duration of ESE:3Hrs		**ESE**	60 Marks	**ESE**	25 Marks
		Total Marks	**100 Marks**	-	**50 Marks**

Pre-Requisites: AICTE Bridge Course, Energy sources, Advance material, water technology.

Course Objectives:

1.	To gain the knowledge of Energy sources, types & Application.
2.	To inculcate knowledge about Advance material.
3.	To enable to students to upgrade the existing knowledge of water technology.
4.	To enlighten the students to the basic process of E-waste management.
5.	To gain the knowledge on synthesis, properties and applications of polymers.

Course Contents

Unit I	**Energy Sources**: Introduction of energy, types of Energy(conventional and non-conventional energy sources), Introduction of fuels, classification and application, Calorific value determination of solid, liquid and Gas, Analysis of solid fuels, Fractional distillation, CNG and Bio-Diesel, Green fuel: Water and Hybrid.
	Activity: Creative poster making on any one **non-conventional energy source.**
Unit II	**Advanced Material**: Introduction of Advance material, Definition and Types of Composite Material, Fibre-Reinforced, Particle-Reinforced, Structural Composites, Role of Composite Materials in Computer Hardware and Infrastructure, Nano materials and Applications, Composition of Liquid Crystal Polymer and Light Emitting Diode.
	Activity: MCQ based quiz on basics of advanced material and nano material.
Unit III	**Water pollution and Softening processes**: Introduction, Sources of pollution, Hardness Coagulation, Sterilization, Softening process (Zeolite process and Ion Exchange Process) Boiler trouble due to scale and sludge, Desalination of water by Reverse osmosis.
	Activity: Crossword Puzzle on the basis of softening process of water
Unit IV	**E-Waste Management**: Introduction of E-waste, Sources of E-waste, Types of E-Waste and its control. Composition of E-waste, Ferrous metals, Non-ferrous metals, Plastics, Hazardous materials, Global and Indian scenario of E-waste generation, Numerical based on E-waste management.
	Activity: Students match waste items (e.g., batteries, printers, circuit boards, smart phones) to **categories** like large/small equipment, ICT, hazardous components. Use real/dummy items or flashcards.
Unit V	**Polymer Science**: Introduction, Classification of Polymers, Uses of commercially important polymers with synthesis, properties and applications, Polyethylene, PVC, Teflon, Terylene, Conducting & Biodegradable Polymers, polyaniline, polypyrrole and polylactic acid.
	Activity: Prepare the chart of types of polymer with their monomers, properties and application.

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Text Books	
T.1	Engineering Chemistry by S.S. Dara, 10th Edition. S. Chand & Co
T.2	Engineering Chemistry Dr. Avinash Bharti, V.K. Walekar, 1st Edition. Tech Max.
T.3	Textbook of Engineering Chemistry: P.C Jain& Monica Jain, 15th Edition.Dhanpatrai publication Ltd
Reference Books	
R.1	Applied Chemistry: Narkhede & Bhake, 1st Edition. Das Ganu Prakashan.
R.2	Engineering Chemistry Dr. Avinash Bharti, V.K. Walekar, 1st Edition. Tech Max
Useful Links	
1	https://nptel.ac.in/courses/103/103/103103206/
2	https://nptel.ac.in/courses/103/108/103108162/
3	https://nptel.ac.in/courses/104/105/104105124/

LIST OF EXPERIMENTS (Advanced Material: BSH41203)		
1	Determination of Moisture Content or Volatile Matter & Ash Content of Coal sample.	CO1
2	Determination of Flash Point of given Oil by Pensky Martine or Abel's Apparatus	CO1
3	Determination of Cation Exchange Capacity by Ion Exchange Resin.	CO2
4	Determination of Heat of Hydration of Given Material.	CO2
5	Determination of Hardness of Water Sample by Complexometric Method.	CO3
6	Determination of Calcium Ion & Magnesium Ion Separately.	CO3
7	Determination of pH of given Solution.	CO4
8	Determination of Electrode Potential by Galvanic Cell.	CO4
9	Determination of saponification value of Bio-Degradable Polymer.	CO5
10	Synthesis of Conducting polymer Polyaniline	CO5

Text Books	
T.1	Experiments and Calculations in Engineering Chemistry by S. Chand
T.2	Practical Engineering Chemistry: By S.N. Narkhede, Dr. R.T. Jadhav, Dr. A.B. Bhake
Reference Books	
R.1	A textbook on experiment and calculation By S.S. Dara
R.2	Inorganic Quantitative analysis, Vogel
Useful Links	
1	https://nptel.ac.in/courses/108/104/10810412345/
2	http://nptel.ac.in/courses/1171012546/

CO	Course Outcomes	CL	Class Sessions
CO1	**Understand** the basics of Energy sources and its properties and application.	2	9
CO2	**Illustrate** knowledge about Advance material.	3	9
CO3	**Differentiate** water pollution and its softening process.	3	9
CO4	**Explain** the types of E-Waste Management.	3	9
CO5	**Predict** types and applications of commercial polymers.	3	9

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Semester-II | **Logic Development and Programming Design: BIT41201**

Teaching Scheme		Examination Scheme(Th)		Examination Scheme(P)	
Theory (Th)	3 Hrs/week	**CT-I**	15 Marks	-	-
Practical (P)	2 Hrs/week	**CT-II**	15 Marks	-	-
Total Credits	**3(Th)+1(P) = 4**	**CA**	10 Marks	**CA**	25 Marks
Duration of ESE:3Hrs		**ESE**	60 Marks	**ESE**	25 Marks
		Total Marks	**100 Marks**	-	**50 Marks**

Pre-Requisites: NA

Course Objectives:

1.	The course aims to provide exposure to problem-solving through programming.
2.	It aims to train the student to the basic concepts of the C-programming language.
3.	This course involves a lab component which is designed to give the student hands-on experience with the concepts.
4.	To express algorithms and draw flowcharts in a language independent manner.
5.	To describe the techniques for creating program modules in C using functions.

Course Contents

Unit I	**Functions**: Introduction, Uses of function, Designing Structured Programs, Scope rule of Function , Return type, Types of Functions-User defined functions, Standard functions, Categories of functions, Call by value and call by reference, Parameter Passing techniques, Storage classes, Recursion.
	Activity 1: Function Detective (Identify & Categorize Functions) **Activity 2. Build and Test – Recursive vs Iterative**
Unit II	**Advance Arrays:** Array notation and representation, manipulating array elements, using multidimensional arrays. Character arrays and strings, declaring Structure, union, enumerated data types, Array of structures, passing arrays to functions. Basic Algorithms: Searching & Basic Sorting Algorithms (Bubble, Insertion and Selection).
	Activity 1: "Matrix Walk" – Understanding 2D Arrays **Activity 2. "Sorting Showdown" – Bubble, Selection, Insertion**
Unit III	**Strings:** Arrays of characters, variable length character strings, inputting character strings, character library functions, string handling functions.
	Activity 1: "String Puzzle Race" – Build and Compare Strings **Activity 2. "String Talk Show" – Character Classification Game**
Unit IV	**Pointers:** Introduction, declaration, applications, Introduction to dynamic memory allocation (malloc, calloc, realloc, free), Use of pointers in self-referential structures, notion of linked list (no implementation)
	Activity 1: "Pointer Chain" – Visualizing Pointer Variables and References **Activity 2. "Dynamic Memory Allocation Role Play"**
Unit V	**File handling:** Data organization, File operation, and File I/O functions, File opening modes, Reading, Trouble in opening file, Standard C preprocessors, defining and calling macros, command-line arguments.
	Activity 1: "File Operation Role Play" **Activity 2. "Macro & Command-line Arguments Puzzle"**

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Text Books	
1	Computer Programming with C, Special Edition-MRCET, Mc Graw Hill Publishers 2017.
2	Computer Science: A Structured Programming Approach Using C, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning.
Reference Books	
1	Let us C ,Yashwanth Kanethkar, 13th Edition, BPB Publications.
2	Computer Programming, E.Balagurusamy, First Edition, TMH.
3	The C Programming Language, B.W. Kernighan and Dennis M.Ritchie, PHI.
Useful Links	
1	https://youtu.be/-wv-OERJK3M
2	https://youtu.be/IdXrCPzNnkU
3	https://youtu.be/5AHRXOtn9bY

Sr. No.	List of Experiment (Logic Development and Programming Design-Lab: BIT41202)	
1	Design a program using user defined functions to determine whether the given string is palindrome or not	CO1
2	Convert string to integer without using library functions	CO1
3	Write a C program to sort an Array in ascending and descending order	CO2
4	Structure C program to manage student details using array.	CO2
5	Implement a c program to compare two strings using string handling function	CO3
6	Write a program in c to reverses a string manually and using strrev().	CO3
7	Demonstrates the use of malloc to allocate memory dynamically using C.	CO4
8	Write a program to find the length of the string using Pointer.	CO4
9	Write a name into a file and read the name from the file using file handling in C.	CO5
10	Micro Project	CO5

CO	Course Outcomes	CL	Class Session
CO1	**Demonstrate** the concept of function using parameter passing, storage classes and recursion	2	9
CO2	**Explain** the process of array declaration, passing array and debug programs in C language.	2	9
CO3	**Illustrate** the process of compile and debug string programs in C language.	3	9
CO4	**Use** the concept of pointers , perform pointer arithmetic, and use the pre-processor	3	9
CO5	**Apply** calling macros and file I/O function for efficient data handling in C .	4	9

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Department of Basic Sciences and Humanities

Program: B. Tech First Year Group-A (AIML/ CSE/ DS /IT)

Semester-II	**Indian Ancient Technology: BSH41204**				
Teaching Scheme		**Examination Scheme (Th)**		**Examination Scheme (P)**	
Theory (Th)	2 Hrs/week	**CT-I**	7 Marks	-	-
Practical (P)	-	**CT-II**	7 Marks	-	-
Total Credits	**2 (Th)**	**CA**	6 Marks	-	-
Duration of ESE: 2Hrs		**ESE**	30 Marks	-	-
		Total Marks	**50 Marks**	-	-

Pre-Requisites: NA

Course Objectives:

1.	To understand the foundational concepts and key developments in ancient Indian technology.
2.	To summarize ancient Indian innovations in metallurgy, architecture, agriculture, and medicine.
3.	To paraphrase the ecological and societal impact of these technologies and their relevance today.

Course Contents

Unit-I	**Foundations of Indian Ancient Technology -** Definition and scope, Sources: archaeological, literary (Vedas, epics, treatises), Chronological overview (Indus Valley to Gupta period and beyond)
	Activity 1: Group presentation on selected ancient technology or scientist. **Activity 2:** Quiz format with speed challenges.
Unit-II	**Technological Innovations & Metallurgy:** Wootz steel and its global influence, Iron Pillar of Delhi and corrosion resistance, Zinc smelting at Zawar mines, Bronze and copper tools in the Harappan civilization.
	Activity 1: Poster creation on sustainability in ancient Indian technology. **Activity 2:** Group discussion on Why did the Iron Pillar resist rust for over 1600 years?
Unit-III	**Science, Medicine & Sustainability -** Astronomy and ancient scientific instruments, Ayurveda and ancient surgical techniques, Ecological practices and sustainable technology, Revival and modern applications of ancient technology.
	Activity 1: Discussion on integrating traditional technologies in modern practices. **Activity 2:** Prepare a chart of Tridosha (Vata, Pitta, Kapha) and match herbs to body types.

Text Books:-

T.1	Aspects of Science and Technology in Ancient India Edited by Arun Kumar Jha and Seema Sahay
T.2	The Ancient Engineers by L. Sprague de Camp
T.3	The Golden Road: How Ancient India Transformed the World by William Dalrymple

Reference Books:-

R.1	"The Wonder That Was India" – A. L. Basham
R.2	"Iron and Steel in Ancient India" – B. R. Pant
R.3	"Indian Medicine in the Classical Age" - – P. Kutumbiah

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Useful Links:-	
1.	https://onlinecourses.nptel.ac.in/noc20_ae10/preview
2.	https://archive.nptel.ac.in/courses/101/104/101104065/
3.	https://hits.digimat.in/nptel/courses/video/101104065/L08.html

Course Code	Course Outcomes	CL	Class Sessions
CO1	**State** major ancient Indian technologies and their principles.	1	4
CO2	**Describe** the processes and applications of metallurgy, architecture, and agriculture in ancient India.	1	4
CO3	**Explain** the sustainability and modern relevance of ancient Indian technologies.	2	4

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Semester-II	**Web Designing:BIT41203**				
Teaching Scheme		**Examination Scheme(Th)**		**Examination Scheme(P)**	
Theory(Th)	-	**CT-I**	-	-	-
Practical(P)	4Hrs/week	**CT-II**	-	-	-
Total Credits	**2(P)**	**CA**	-	**CA**	25 Marks
Duration of ESE:	-	**ESE**	-	**ESE**	25 Marks
		Total Marks	-	-	**50 Marks**

Pre-Requisites: NA

Course Objectives:

1. To aware about different tools for Web Programming.
2. To demonstrate proficiency in writing and applying HTML code.
3. To design efficient client side and server side scripts for dynamic web applications.
4. To Understand XML structure, tags, validation, and Document Object Model.
5. To construct web pages using CSS and JavaScript.

Course Contents

Unit I	**Web Foundations:** The Evalution of the Web, History of the Web, Internet Application, Networks, TCP/IP, Higher Level Protocols, Components of the Web, Web Search Engines, Web Servers, Application Servers
Unit II	**HTML -** History of HTML, Title and Footers, Text Formatting, Emphasizing Material in a Web Page List, Text Styles, Other Text Effects, Lists, Adding Graphics to HTML Documents, Tables, Linking Documents, images, forms, Frames, Global Attributes <sup>Tag, <svg>Tag,
Unit III	**Cascading Style Sheets:-**Introduction CSS, Creating Style Sheets, Common Tasks with CSS, Colours - Colour Properties, Image Properties, Position Properties, Background Properties, The Font Family, Layer Tag
Unit IV	**XML:** Introduction to XML, Features of XML, Defining XML tags, their attributes and Values, Document Type Definition, XML Schemes, Document Object Model.
Unit V	**JavaScript:** Introduction JavaScript, JavaScript in Web pages:-Netscaps and JavaScript, Client side JavaScript, Data Types and Literal, Boolean, String, Null, Type Casing, Operators and Expressions in JavaScript.

Text Books

1	Web Technologies Black Book: HTML, JavaScript, PHP, Java, JSP, XML and AJAX, Kogent Learning Solutions Inc., Dream tech Press, 2009
2	M. Srinivasan, Web Technology: Theory and Practice, Pearson India, 2012.
3	The Complete Reference PHP—Steven Holzner, Tata McGraw-Hill

Reference Books

1	Internet and World Wide Web—How to program. Dietel and Nieto, Pearson.
2	Web Programming, building internet applications, Chris Bates 2″ edition, Wiley Dreamtech
3	Java Server Pages—Hans Bergsten, SPD O'Reilly,

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Useful Links	
1	https://nptel.ac.in/courses/106/105/106105084/
2	https://nptel.ac.in/courses/106/105/106105084/
3	https://nptel.ac.in/courses/106/105/106105084/

List of Experiment		
1	Demonstrate various tags in HTML	CO1
2	Design a page having suitable background color and text color with title "My First Web Page" using all the attributes of the Font tag.	CO2
3	Create a HTML document giving details of your [Name, Age], [Address, Phone] and [Register Number, Class] aligned in proper order using alignment attributes of Paragraph tag.	CO2
4	Write HTML code to design a page containing some text in a paragraph by giving suitable heading style.	CO3
5	Create a page to show different character formatting (B, I, U, SUB, SUP) tags. **viz : log b m^p= p logb m**	CO3
6	Create a staggered slide-in animation for list elements using HTML, CSS, and transition-delay with a checkbox trigger	CO4
7	Create an image overlay effect on hover using pseudo-elements, flexbox for text alignment, and CSS transitions.	CO5
8	Design a bouncing loader animation using HTML, CSS `@keyframes`, and transform properties with staggered animation delays	CO5
9	Create a sample HTML file with a submit button, and use JavaScript to modify the style of the paragraph text.	CO5
10	Write a JavaScript function to get the values of first and last names of the following form.	CO5

CO	Course Outcomes	CL	Lab Sessions
CO1	**Explain** the basic fundamentals of Web Foundations.	2	4
CO2	**Describe** the usage of formatting tags in HTML for web development.	2	4
CO3	**Implement** high-level formatting using Cascading Style Sheets (CSS).	3	4
CO4	**Apply** methods of information exchange between computer systems such as websites, databases, and third-party applications.	3	4
CO5	**Use** JavaScript to integrate with web pages, applying scripts and handling data types and expressions effectively.	3	4

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Semester-II	**Social Internship (BSH41205)**				
Teaching Scheme		**Examination Scheme (Th)**		**Examination Scheme(P)**	
Practical (P)	-	**Internal**	25 Marks	-	-
-	-	-	-	-	-
Total Credits	**1**	-	-	-	-
Duration of ESE:2Hrs		**Report Submission**	25 Marks	-	-
		Total Marks	**25 Marks**	-	-

Pre-Requisites: NA

Course Objectives:

1.	To develop a sense of responsibility and empathy toward community welfare and social issues.
2.	To motivate students to contribute time, skills, and effort to NGOs, rural development programs.
3.	To align student efforts with national development goals like health, education, environment.

Course Contents

Unit I	**Introduction of Social Responsibility and community Collaboration:** Introduction, Types and Understanding of Social Responsibility. Understand community and diversity and introduction and types of social issues and its challenges to overcome.
	Activity: **Draw the chart of Various Social issues in Daily life**
Unit II	**Introduction of Social Organization and initiatives:** Introduction of Social Organization and its Types, Introduction of social program and scheme, role and responsibility of volunteers and intern. Essential Skil for social engagement, Social Organization collaboration and confirmation.
	Activity: **Identification and planning for Internship with organization.**
Unit III	**Practical Implementation & reflection of Social Internship:** Process and Observation of Internship, Report and Workbook writing on basis of routine activity and reflection of learning, submission of detail report on Social internship along with outcome.
	Activity: **Submission of Detail Internship Report and its Outcome.**

Text Books

T.1	Social Welfare Administration in India, Sachdeva D.R. Kitab Mahal 2nd Edition.
T.2	*Social Problems in India,* Ram Ahuja, Rawat Publications 3rd Edition.

Reference Books

R.1	Contemporary Social Problems in India, G.R. Madan, Allied Publishers
R.2	Fieldwork Training in Social Work, Sanjoy Roy, Rawat Publications

Useful Links

1	https://www.youtube.com/watch?v=Xz_TLJmatGc
2	https://www.youtube.com/watch?v=Xz_TLJmatGc

CO	Course Outcome	CL	Lab Sessions
CO1	**Understand** the concept of Social Responsibility and Community Collaboration.	2	4
CO2	**Implement** and document the Social Internship process.	3	4
CO3	**Apply** essential skills for social engagement and internship planning.	3	4

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Semester-II	**Python Programming(BIT41204)**				
Teaching Scheme		**Examination Scheme(Th)**		**Examination Scheme(P)**	
Theory(Th)	-	**CT-1**	-	-	-
Practical(P)	4 Hrs/week	**CT-2**	-	-	-
Total Credits	**2 (P)**	**CA**	-	**CA**	25 Marks
Duration of ESE:		**ESE**	-	**ESE**	25 Marks
		Total Marks	-	-	50 Marks

Course Objective:

1	To read and write simple Python programs.
2	To develop Python programs with conditionals and loops
3	To define Python functions and call them.
4	To use Python data structures lists, tuples, and dictionaries.
5	To Apply file and exception handling to manage I/O and runtime errors in Python.

Course Contents

Unit I	**Introduction to Python Programming Language:** Introduction to Python Language, python interpreters, working with python, Numeric Data Types: int, float, Boolean, complex and string and its operations, Standard Data Types: List, tuples, set and Dictionaries, Data Type conversions, commenting in python.
Unit II	**Variables and Operators:** Python variables, Multiple variable declarations, Python basic statements, Python basic operators: Arithmetic operators, Assignment operators, Comparison operators, Logical operators, Identity operators, Membership operators, Bitwise operators, Precedence of operators, Expressions.
Unit III	**Control Flow and Loops:** Conditional (if), alternative (if-else), chained conditional (if- elif -else), Loops: For loop using ranges, string, Use of while loops in python, Loop manipulation using pass, continue and break
Unit IV	**Functions:** Calling Functions, passing parameters and arguments, Python Function arguments: Keyword Arguments, Default Arguments, Variable-length arguments, Anonymous Functions, Fruitful Functions (Function Returning Values), Scope of the Variables in a Function - Global and Local Variables. Powerful Lambda functions in python.
Unit V	**File Handling and Exception handling:** Overview, Access Modes, Writing Data to a File, Reading Data from a File, Additional File Methods introduction to Errors and Exceptions, Handling IO Exceptions, Run Time Errors, Handling Multiple Exceptions.

Text Books

1	R. Nageswara Rao, “Core Python Programming”, dreamtech
2	Allen B. Downey, ``Think Python: How to Think Like a Computer Scientist‘‘, 2nd edition, Updated for Python 3, Shroff/O‘Reilly Publishers, 2016.
3	Python Programming: A Modern Approach, Vamsi Kurama, Pearson

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Reference Books	
1	Core Python Programming, W.Chun, Pearson.
2	Introduction to Python, Kenneth A. Lambert, Cengage
3	Learning Python, Mark Lutz, Orielly
Useful Links	
1	https://nptel.ac.in/courses/106106182
2	https://nptel.ac.in/courses/106106212
3	https://nptel.ac.in/courses/106107220

Sr. No.	List of Experiment	
1	Installation of Python path setting and its testing.	CO1
2	Design a python program to get string, int, float input from user and observe the output	CO1
3	Implementation of Python programming on various conditional operators	CO1
4	Implement a program to find the smallest and largest number in the list?	CO2
5	Implement a code to perform arithmetic, assignment, logical and comparison operators?	CO2
6	Write a Program to read a number and display corresponding day using if_elif_else?	CO3
7	Design a python program using with any one of python function argument?	CO4
8	Implement a python program to write the content “hi python programming” for the existing file.	CO5
9	Mini Project	CO5

	Course Outcomes	CL	Class Session
CO1	**Understand** the behavior of fundamental programming concepts	2	4
CO2	**Explain** the fundamental concepts and syntax of the Python programming language.	2	4
CO3	**Construct** a Python program by breaking it into logically structured, reusable functions..	3	4
CO4	**Use** Python lists, tuples, and dictionaries to handle and manipulate compound data.	3	4
CO5	**Implement** file handling operations to read from and write data to files in Python programs.	3	4

				**July, 2025**	**4.00**	**Applicable for AY 2025-26 Onwards**
Chairperson	**Dean Academics**	**Vice Principal**	**Principal**	**Date of Release**	**Version**	