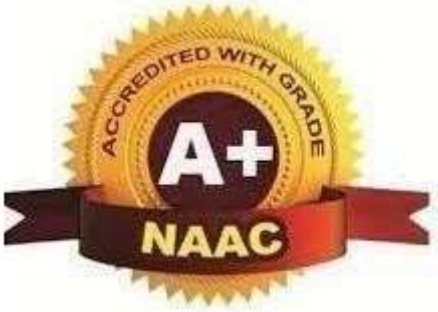
TULSIRAMJI GAIKWAD-PATIL College of Engineering & Technology

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-B Semester – I (AE/CE/ME)

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-B)																
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	BSH41106	Chemical Process in Engineering	T	3	0	2	5	3	30	10	60	100	3
3	1	BSC	S&H	BSH41107	Chemical Process in Engineering-Lab	P	0	2	-	2	1	25	-	25	50	-
4	1	ESC	CE	BCE41101	Engineering Mechanics	T	3	0	2	5	3	30	10	60	100	3
5	1	IKS	S&H	BSH41204	Indian Ancient Technology	T	2	0	2	4	2	15	5	30	50	1
6	1	ESC	ME	BME41101	IDEA-Lab & Engineering Workshop	P	0	4	-	4	2	50	-	-	50	-
7	1	ESC	CE	BCE41102	Environment Sustainability -Lab	P	0	2	-	2	1	25	-	25	50	-
8	1	VSEC	CSE	BCS41104	Fundamentals of Computer-Lab	P	0	2	-	2	1	25	-	25	50	-
9	1	VSEC	S&H	BSH41205	Social Internship	P	0	2	-	2	1	50	-	-	50	-
10	1	PCC	AE/ ME/ CE	BAE41101/ BME41102 BCE41103	Basics of Aircraft Design-Lab / CNC Machine and Programing-Lab / Building Maintenance -Lab	P	0	4	-	4	2	25	-	25	50	-
11	1	CC	S&H	BSH41X01	Liberal Learning Module-I	P	0	4	-	4	2	50	-	-	50	-
TOTAL FIRST SEM							**12**	**20**	**08**	**40**	**22**	**330**	**35**	**310**	**675**	**10**
SECOND SEMESTER (GROUP-B)																
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	BSH41206	Solid State Physics & Optics	T	3	0	2	5	3	30	10	60	100	3
3	2	BSC	S&H	BSH41210	Solid State Physics & Optics-Lab	P	0	2	-	2	1	25	-	25	50	-
4	2	ESC	EE	BEE41201	Principle of Electrical Engineering	T	3	0	2	5	3	30	10	60	100	3
5	2	ESC	EE	BEE41202	Principle of Electrical Engineering -Lab	P	0	2	-	2	1	25	-	25	50	-
6	2	ESC	ME	BME41202	Engineering & Computer Graphics	T	2	0	2	4	2	15	5	30	*50	1
7	2	ESC	IT	BIT41205	'C' Language -Lab	P	0	2	2	4	1	25	-	25	50	-
8	2	VSEC	CE	BCE41201	Computer Aided Drawing-Lab	P	0	2	-	2	1	25	-	25	50	-
9	2	VSEC	S&H	BSH41105	Professional Etiquette	P	0	2	-	2	1	50	-	-	50	-
10	2	AEC	S&H	BSH41104	Digital Wellness & Basic Communication Lab	P	0	4	-	4	2	50	-	-	50	-
11	2	CC	S&H	BSH41Y01	Liberal Learning Module-II	P	0	4	-	4	2	50	-	-	50	-
TOTAL SECOND SEM							**12**	**18**	**10**	**40**	**21**	**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 / 06	--	--	02	02	--	--	02
Credits SEM-II	08 / 07	02	--	02	--	02		02
Cumulative Sum	16 / 13	02	--	04	02	02	--	04

PROGRESSIVE TOTAL CREDITS: 22+21=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-B (AE/CE/ME)

Liberal Learning Modules for SEM-I

SN	Sem	Type	Bo S/ Dep t.	Sub. Code	Subject	T/P	Contact Hours			Credi ts	Weightage		
							L	P	Hrs		INT (1-Certificate)	ESE (MCQ)	External Practical
1	1	CC	S&H	BSH42Y01	Art & Craft	P	2	2	4	2	25	-	25
2	1	CC	S&H	BSH42Y02	Poster & Video Design	P	2	2	4	2	25	-	25
3	1	CC	S&H	BSH42Y03	IPD (Integrated of Personality Development)	P	2	2	4	2	25	25	-
4	1	CC	S&H	BSH42Y04	Sports (Outdoor & Indoor)	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	BSH41X05	Interactive English (Level-1)	P	2	2	4	2	25	25	-
7	1	CC	S&H	BSH41X06	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	Bo S/ Dep t.	Sub. Code	Subject	T/P	Contact Hours			Credi ts	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	BSH42Y05	Interactive English (Level-2)	P	2	2	4	2	25	25	-
7	2	CC	S&H	BSH42Y06	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	BSH42Y10	Foreign Language –Japanese (Level-2)	P	2	2	4	2	25	25	-

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Program: B.Tech First Year (AE/CE/ME)

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: AICTE Bridge course, Basics of Mathematics

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.

Course Contents

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-Leibnitz Theorem, 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 **Activity 2: Cross word puzzle based on Partial Derivative**
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 **Activity 2: Cross word puzzle based on Sequence & Series**

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	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://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/

Course Code	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 (AE/CE/ME)

Semester-I | **Chemical Process In Engineering: BSH41106**

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:3 Hrs		**ESE**	60 Marks	**ESE**	25 Marks
		Total Marks	**100 Marks**	-	**50 Marks**

Pre-Requisites: AICTE Bridge Course, Energy sources, Water technology, Engineering material, Thermodynamic

Course Objectives:

1.	To gain the knowledge of Energy sources and their Application.
2.	To Identify different types of corrosion and its controls.
3.	To enable to students to upgrade the existing knowledge of water technology.
4.	To gain the knowledge on basics of Thermodynamics and Battery Technology.
5.	To enlighten the students to the basic process of Engineering materials.

Course Contents

Unit I	**Energy Sources** : Introduction of energy, Introduction of fuels, Conventional and non-conventional energy sources **er,** Calorific value determination of solid, liquid and Gases fuel, Analysis of solid fuels, Fractional distillation of crude petroleum oil, CNG, Bio-Diesel, Lubricant and types of Lubrication, Rocket: Propulsion and Propellant.
	Class activity: Creative poster making on any one non-conventional energy source.
Unit II	**Corrosion and its Control:** Introduction, Types of corrosion: Dry and Wet corrosion, Mechanism of dry and wet corrosion, Factor affecting corrosion: Nature of metal and nature of environment, Types of wet corrosion, Pitting, waterline, stress and galvanic corrosion, Methods of corrosion control- Cathodic protection by Sacrificial anode, PB ration.
	Class activity: MCQ based quiz on types of corrosion
Unit III	**Water pollution and Softening processes**: Introduction, Sources of pollution, Hardness, Domestic water treatment, Softening process (Zeolite process and Ion Exchange Process) Boiler trouble due to scale and sludge, Desalination of water by Reverse osmosis.
	Class activity: Crossword Puzzle on the basis of softening process of water
Unit IV	**Thermodynamics & Battery Technology**: Basics of thermodynamics, Laws of thermodynamics, Concept of Internal Energy, Introduction of batteries, Types of Batteries with construction, working and their applications (Carbon-Zn, Ni-Cd, Lead Acid battery) H_2-O_2 Fuel cell and its applications.
	Class activity: Open Book test on recent battery trends.
Unit V	**Engineering Materials**: Cement: Introduction, raw materials, manufacturing of cement by wet process and dry process, properties of cement: setting and hardening, heat of hydration. Composite materials and its types, Nano materials and Application in electronics devices, agricultural and medicinal sector.
	Class activity: Case study for Types of Cement, composition and its application in construction.

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, 15thEdition.Dhanpatrai publication Ltd

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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
R.3	Textbook of Engineering Chemistry: P.C Jain& Monica Jain, 15thEdition.Dhanpatrai publication Ltd
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 (BSH41107)		
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 rate of corrosion by acids and by increasing temperature.	CO2
4	Determination of Electrode Potential by Galvanic Cell.	CO2
5	Determination of Hardness of Water Sample by Complexometric Method.	CO3
6	Determination of Calcium Ion & Magnesium Ion Separately.	CO3
7	Estimation of amount of zinc liberated during electrolysis.	CO4
8	Determination of current by using salt water battery.	CO4
9	Determination of pH of given Solution.	CO5
10	Determination of Heat of Hydration of Given Material.	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	**Predict** Causes of corrosion, its Consequence and methods of protections	3	9
CO3	**Differentiate** water pollution and its softening process.	3	9
CO4	**Illustrate** Bulk Properties and Process of thermodynamics and types of battery.	3	9
CO5	**Interpret** types and applications engineering materials.	3	9

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Program: B. Tech First Year (AE/CE/ME)

Semester-I | **Engineering Mechanics: BCE41101**

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

Pre-Requisites: NA

Course Objectives:

1.	To understand and analyze the effect of forces and moment on the body and force system.
2.	To demonstrate concept of equilibrium and condition of equilibrium.
3.	To estimate concept of moment of inertia and apply on rectangular, square, circular and composite section.
4.	To apply kinematics of linear motion, Work energy principal.
5.	To analyze D'Alembert's principle and apply on connected bodies, method of momentum.

Course Contents

Unit I	**Force Systems and Principles of Static Equilibrium:** Fundamentals of Force Systems and Statics: Definition of Statics & Dynamics, Force and Its Characteristics, Classification of Force Systems, Principles of Statics, Law of moments, Resultant and general force system, Moment of a Force about a Point and Axis, couple moment as free vector. Resolution of forces.
	Activity 1: Game Pedagogy: Crosswords Puzzles: Arrange the words Across and Down for Statics Mechanics **Activity 2: Open Book Test**
Unit II	**Equilibrium of Force system:** Equilibrium of Force Systems, Free Body Diagrams (FBDs), Resultant and Equilibrium of concurrent and non-concurrent forces, Equilibrium of parallel force systems in space. Equilibrium of Three Forces in a Plane and Space. Truss and beams – type of trusses, type of beams, type of load and type of end supports.
	Activity 1: Model-Making Activity: Develop a model representing a concurrent/ non-concurrent force system. **Activity 2: Power Point Presentation**
Unit III	**Centroid and Moment of Inertia of Plane Areas:** Definition of Centroid and Center of Gravity, centroid of simple figures, centroid of composite structures. Moment of inertia of plane sections from first principles, theorems of moment of inertia (Parallel Axis Theorem, Perpendicular Axis Theorem), Principal Axes and Principal Moments of Inertia, Mohr's Circle for Moment of Inertia
	Activity 1: Model-Making Activity: Develop a model representing a concurrent/ non-concurrent force system. **Activity 2: Power Point Presentation**

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Unit IV	**Kinematics: Motion, Laws, and Applications:** Definition and scope of kinematics, Rectilinear Motion of Particles, Newton's Laws of Motion, Newton's motion Law, Projectile Motion, Relative Motion Analysis, Motion Curves and Graphical Analysis.
	Activity 1: Pendulum with Adjustable Mass (triangle, square, irregular shapes) **Activity 2: Balancing Shapes Experiment**
Unit V	**Principles of Dynamic Motion: Impact, Inertia, and Work-Energy:** Impulse and Momentum Principles, Linear impulse momentums, consideration for system of particles, elastic impact of two bodies, direct central impact. Principle work energy method Alembert's Principle, Inertia force and concept of dynamic equilibrium.
	Activity 1: Real Time Problem Activity: Kinematics and Dynamic Motion **Activity 2: Open Book Test**

Text Books	
T.1	Engineering Mechanics, S. S. Bhavikatti, New Age International Pvt. Ltd., 6th Edition.
T.2	Engineering Mechanics, R. K. Bansal and Sanjay Bansal, Jain Bros. Publishers, Delhi, 4thEdition.
T.3	Textbook of Applied Mechanics", Ramamrutham. S., Dhanpat Rai Publications, 1987 Engineering Mechanics (Statics and Dynamics), Palanichamy, M. S., and Nagan, S., 3rd Edition.
Reference Books	
R.1	Vector Mechanics for Engineers Vol.-I and II, F. P. Beer and E. R. Johnston, Tata Mc- Graw Hill Publication 9th Edition.
R.2	Engineering Mechanics, Irving H. Shames, Prentice Hall of India, New Delhi,4th Edition.
R.3	Engineering Mechanics, Timoshenko and Goodier
Useful Links	
1	https://nptel.ac.in/courses/112/103/112103109/
2	https://nptel.ac.in/courses/112/106/112106286/

CO	Course Outcomes	CL	Class Session
CO1	**Understand** the fundamental concepts of statics including types of force systems, force characteristics, and principles of equilibrium.	2	9
CO2	**Illustrate** Resultant and Equilibrium of concurrent and parallel forces	3	9
CO3	**Demonstrate** the centroid of composite figures and moment of inertia of plane sections	3	9
CO4	**Illustrate** the Kinematics of rectilinear motion, motion curves, Newton's motion Law, and relative velocity.	3	9
CO5	**Apply** the system of particles, elastic impact of two bodies, direct central impact. Principle work energy.	3	9

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Program: B.Tech First Year (AE/CE/ME)

Semester-I | **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:

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

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

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CO	Course Outcomes	CL	Class Sessions
CO1	**State** major ancient Indian technologies and their principles.	1	9
CO2	**Describe** the processes and applications of metallurgy, architecture, and agriculture in ancient India.	1	8
CO3	**Explain** the sustainability and modern relevance of ancient Indian technologies.	2	8

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Department of Basic Sciences and Humanities

Program: B. Tech First Year (AE/CE/ME)

Semester-I | **IDEA-Lab & Engineering Workshop: BME41101**

Teaching Scheme		Examination Scheme(Th)		Examination Scheme(P)	
Theory (Th)	-	**CT-I**	-	-	-
Practical (P)	2 Hrs/week	**CT-II**	-	-	-
Total Credits	**2 (P) = 1**	**CA**	-	**CA**	25 Marks
-		**ESE**	-	**ESE**	25 Marks
		Total Marks	-	-	**50 Marks**

Course Objectives:

1.	To understand different manufacturing processes which are commonly employed in the industry.
2.	To give hands on training and practice to students for use of various tools, devices, equipment and machines.
3.	To analyze different types of welding process with the help of welding simulation package

List of Experiment

1	**Fitting:** Use and setting of fitting tools for chipping, cutting, filing, marking, center punching, drilling and tapping. **Job-1:** Fitting to size, male-female fitting with drilling and tapping.	CO1
2	**Carpentry**: Use and setting of hand tools like hacksaws, jack planes, chisels and gauges for construction of various joints, wood tuning and modern wood turning methods. **Job-2:** L Joint / T Joint / Cross joint	CO2
3	**Welding:** Use and setting of tools and equipment for edge preparation for welding jobs and Arc welding for different job. **Job-3:** Lap welding of two plates / butt welding of plates.	CO3
4	**Welding Simulation:** introduction to welding, types of welding process, types of joints, materials, application of different types of welding. **Job-4:**Job on Simulation Package Software	CO4
5	**Fasteners:** Types of fastening process, Screw threads, nut & bolt. Demonstration of thread forming/machining and its measurement.	CO5

Text Books

T.1	"Elements of Workshop Technology":Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K, 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai.
T.2	"Manufacturing Technology – I":Gowri P., Hariharan and A. Suresh Babu, Pearson Education, 2008.

Reference Books

R.1	"Process and Materials of Manufacture": Roy A. and Lindberg, 4th Edition, Prentice Hall India 1998.
R.2	"Elements of Workshop Technology": S K Hajra, Choudhury, A K Hajra, Choudhury, &Nirjhar Roy, Vol. I &II.
R.3	"A Course in Workshop Technology":B S Raghuwanshi, Vol. 1 & II.

Useful Links

1	https://nptel.ac.in/courses/112/103/112103305/
2	https://nptel.ac.in/courses/112/107/112107145/
3	https://nptel.ac.in/courses/112/107/112107144/
4	https://nptel.ac.in/courses/112/103/112103306/

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CO	Course Outcomes	CL	Class Session
CO1	**Identify** marking tools, hand tools, measuring instruments and to work to prescribed dimensions/tolerances on mating of two metal parts.	1	4
CO2	**Understand** carpentry tools for wooden joints, Simple exercise using jack plane.	2	4
CO3	**Apply** the joint by Arc welding, Simple butt and Lap welded joints.	3	4
CO4	**Demonstrate** advance welding process on simulation package to obtain practical skills in the various trades.	3	4
CO5	**Differentiate** types of fasteners and evaluate their suitability for specific mechanical or structural uses.	4	4

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Program: B. Tech First Year(AE/CE/ME)

Semester-I	Environment Sustainability-Lab: BCE41102				
Teaching Scheme		**Examination Scheme (Th)**		**Examination Scheme (P)**	
Theory (Th)	-	-	-	-	-
Practical (P)	2 Hrs./week	-	-	-	-
Total Credits	**1**	-	-	**IA**	25 Marks
-		-	-	**ESE**	25 Marks
		-	-	**Total**	**50 Marks**

Pre-Requisites: NA

Course Objectives:

1.	Develop skills to assess and manage water resources sustainably.
2.	Apply techniques to control soil erosion and waste recycling.
3.	Analyze environmental impacts of air and energy systems.
4.	Design sustainable infrastructure using permeable materials and green roofs.
5.	Evaluate carbon footprints and promote eco-friendly civil engineering practices.

Course Contents

Sr. No.	Name of Experiment	CO mapped
1.	Assess the quality of water samples from different sources	CO-1
2.	Construct and evaluate a small-scale rainwater harvesting system	CO-1
3.	Study soil erosion and evaluate control measures	CO-2
4.	Demonstrate the composting process for organic waste	CO-2
5.	Measure air pollution levels in different locations	CO-3
6.	Assess energy consumption in a classroom	CO-3
7.	Evaluate water infiltration in permeable pavements	CO-4
8.	Assess the recyclability of construction waste	CO-4
9.	Estimate personal carbon footprints	CO-5
10.	Evaluate the benefits of green roofs	CO-5

Text Books

T.1	Peavy, H. S., Rowe, D. R., & Tchobanoglous, G. (2017). Environmental Engineering, McGraw-Hill Education
T.2	Davis, M. L., & Cornwell, D. A. (2014). Introduction to Environmental Engineering (5th ed.), McGraw- Hill Education
T.3	Masters, G. M., & Ela, W. P. (2014). Introduction to Environmental Engineering and Science (3rd ed.), Pearson
T.4	Sharma, H. D., & Reddy, K. R. (2004). Geoenvironmental Engineering: Site Remediation, Waste Containment, and Emerging Waste Management Technologies, Wiley
T.5	Newman, J., & Choo, B. S. (2003). Advanced Concrete Technology: Constituent Materials, Elsevier

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Reference Books	
R.1	Sachs, J. D., & Ban, K. (2015). The Age of Sustainable Development. Columbia University Press
R.2	Kubba, S. (2010). LEED Practices, Certification, and Accreditation Handbook. Elsevier
R.3	Rittmann, B. E., & McCarty, P. L. (2001). Environmental Biotechnology: Principles and Applications. McGraw-Hill
R.4	LaGrega, M. D., Buckingham, P. L., & Evans, J. C. (1994). Hazardous Waste Management. McGraw-Hill
R.5	Thibodeaux, L. J. (1996). Environmental Chemodynamics: Movement of Chemicals in Air, Water, and Soil (2nd ed.). Wiley Interscience.

Useful Links	
1	https://archive.nptel.ac.in/courses/127/105/127105018/
2	https://onlinecourses.nptel.ac.in/noc19_ce40/preview
3	https://archive.nptel.ac.in/courses/127/106/127106004/
4	https://onlinecourses.nptel.ac.in/noc19_ce32/preview
5	https://onlinecourses.nptel.ac.in/noc22_ch33/preview

CO	Course Outcomes	CL	Lab Session
CO1	**Apply** methods to assess water quality and design rainwater harvesting systems.	2	4
CO2	**Implement** erosion control and manage organic waste sustainably.	2	4
CO3	**Evaluate** air quality data and develop strategies to optimize classroom energy use.	3	4
CO4	**Assess** permeable pavements and formulate plans for recycling construction waste.	3	4
CO5	**Analyze** carbon footprints and design green roof models for environmental benefits.	3	4

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Program: B.Tech First Year (AE/CE/ME)

Semester-I	Fundamentals of Computer-Lab: BCS41104				
Teaching Scheme		Examination Scheme (Th)		Examination Scheme (P)	
Theory (Th)	-	CT-I	-	-	-
Practical(P)	4 Hrs/week	CT-II	-	-	-
Total Credits	2 (P)	CA	-	-	25 Marks
Duration of ESE: 2Hrs		ESE	-	-	25 Marks
		Total Marks	-	-	50 Marks

Pre-Requisites:

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	**Introduction to Computer:** - Characteristics of Computers, Basic Applications of Computer, Classifications of Computers: Representation of data/Information concepts of data processing, Definition of Information and data, Basic data types Storage of data/Information as files **Components of Computer System:** Central Processing Unit (CPU), VDU, Keyboard and Mouse, Other input/output Devices, Computer Memory, Concepts of Hardware and Software
Unit-II	**Introduction to Operating System:** - Overview of Operating System, Booting Process of Operating System, Functions or Tasks of the Operating System, I/O Management, Data Management, Memory Management, Device Management **PC Troubleshooting, Maintenance and Tools: -** Preventive Maintenance: Active, Passive, periodic maintenance procedure, Preventive maintenance of peripherals of PCs. Fault finding and troubleshooting of the above peripherals, Diagnostic software
Unit-III	**Introduction of TCP/IP: -** Characteristics of TCP/IP, TCP/IP Layers, Application/Uses of TCP/IP, Introduction of LAN, WAN and MAN Microsoft Office Installation and Document Formatting:- Microsoft Office Installation, Introduction to Microsoft Word/Excel/Power Point Presentation, Document Formatting and Styling, Advanced Word Features

Text Books :-

T.1	Fundamentals of Computers, V. Rajaraman, PHI Learning Pvt. Ltd., 6th Edition.
T.2	Computer Fundamentals, P.K. Sinha & Priti Sinha, BPB Publication, 6th Revised Edition

Reference Books:-

R.1	Introduction to Computers, Peter Norton, McGraw-Hill Education, 7th Edition.
R.2	Computer fundamentals, Anita Goel, Pearson Education, 1st Edition.
R.3	Information Technology: Principles and Applications, A.K. Sharma, University Science Press(Laxmi publications), Latest Edition

Useful Links:-

1.	https://youtu.be/eEo_aacpwCw
2.	https://youtu.be/dOiA2nNJpc0
3.	https://youtu.be/gxsFmFU4al0

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Sr. No.	List of Experiment	
1	To identify the computer hardware parts Procedure.	CO1
2	Assembling and disassembling the system hardware components of the personal computer Requirements: 1. CPU (Processor) 2. Mother Board 3. Floppy Disk Drive Monitor 4. Cabinet 5. Speaker 6. Key Board 7. Mouse 8. Bus Cables 9. RAM (SD or DDR) 10. Hard Disk Drive 11. Power 12. SMPS 13. Monitor 14. Screw 15. Printer 16. CD or DVD ROM Cables Driver	CO1
3	The installation steps for the Windows operating system. Requirement: 1. Operating System CD 2. Computer	CO1
4	The installation steps for the Linux operating system. Requirement: 1. Operating System CD 2. Computer	CO2
5	To facilitate a software troubleshooting exercise, students will be provided with a malfunctioning CPU afflicted by system software issues. Their task will be to diagnose and resolve the problem to restore the computer to working condition.	CO2
6	To learn about Local Area Networks and Internet access, students will configure the TCP/IP settings. In the final step, students should demonstrate to the instructor how to access websites and email	CO2
7	To learn about various internet threats and configure their computer to be secure while online.	CO2
8	Installation MS Office Apply different alignments, correct formats in MS-Word, Excel and Power Point Presentation.	CO3
9	Create a Visiting Card of your college using page size as follows • Page width=”3.2” • Page height=”2” And use different font styles, sizes, alignments, and apply printed water mark on the paper.	CO3
10	Create a mail merge to call 10 members for an interview.	CO3

CO	Course Outcomes	CL	Class Session
CO1	**Understand** and explain the basic structure, components, and functioning of a computer system.	2	4
CO2	**Demonstrate** knowledge of operating system functions, data storage, and perform basic troubleshooting and maintenance of PCs.	3	4
CO3	**Apply** the uses of Microsoft Office tools (Word, Excel, PowerPoint) for document creation, formatting, and presentation.	3	4

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Department of Basic Sciences and Humanities

Program: B.Tech First Year (AE/CE/ME)

Semester-I	Social Internship (BSH41205)				
Teaching Scheme		**Examination Scheme (Th)**		**Examination Scheme(P)**	
Practical (P)	-	**Internal**	50 Marks	-	-
-	-	-	-	-	-
Total Credits	**1 (Pr) = 2**	-	-	-	-
Duration of ESE:2Hrs		**Report Submission**	50 Marks	-	-
		Total Marks	**50 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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Program: B.Tech First Year (AE/CE/ME)

Semester-I | **Basics of Aircraft Design: BAE41101**

Teaching Scheme		Examination Scheme(Th)		Examination Scheme(P)	
Theory (Th)	-	-	-	-	-
Practical (P)	4 Hrs/week	-	-	-	-
Total Credits	2	-	-	**CA**	25 Marks
Duration of ESE:		-	-	**ESE**	25 Marks
		-	-	**Total**	**50 Marks**

Pre-Requisites: NA

Course Objectives:

1. To introduce students to the fundamental principles of aircraft component drawing.
2. To develop students proficiency in producing 2D and 3D representations of aircraft components.
3. To familiarization with GD&T principles and symbols commonly used in aeronautical engineering.

Course Contents

Unit I	**Fundamentals of Aircraft Component Drawing and Aerospace Standards**: Introduction to the course and its relevance in the aerospace industry, Overview of aerospace materials and their importance in design, Basic manufacturing processes used in aerospace, Regulatory framework and compliance in aerospace component design, Drawing standards and conventions in aircraft component documentation
Unit II	**Technical Drawing and Representation Techniques:** Basics of technical drawing: line types, drawing scales, orthographic and isometric projection, Creating accurate 2D drawings of aircraft components, Representing 3D aircraft parts in 2D using projection techniques, Introduction to assembly drawings and sub-assemblies, Component relationships, fit, and alignment considerations in aerospace assemblies.
Unit III	**Precision Drawing with GD&T and Manufacturing Integration:** Principles and symbols of Geometric Dimensioning and Tolerancing (GD&T), Application of GD&T in aircraft component drawings, Communication of tolerances and geometric features clearly, Integration of material and manufacturing considerations in drawing practices, Ensuring compliance and manufacturability in aerospace drawings.

Text Books

T.1	Aircraft Computer Aided Drafting by N Prabhu Kishore, Alekhya N, MdKhaleel, Educreation Publishing, 2018.
T.2	Geometrical and Machine Drawing by N. D. Bhatt, Charotar Publishing House Pvt. Limited, 20th Ed., 2014.
T.3	A Textbook of Machine Drawing by R.K.Dhawan, S. Chand Limited, 1998.

Reference Books

R.1	Airplane Drawing by Joseph William Giachino, Henry Arthur Sonsmith, Goodheart-Wilcox Company, 1941.
R.2	Scale Aircraft Drawings by Peter M. Bowers, Creative Media Partners,2021.
R.3	Janes All the World's Aircraft: Development & Production, Jane's Information Group, 2022.

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Useful Links	
1	https://onlinecourses.nptel.ac.in/noc22_me29
2	https://nptel.ac.in/courses/107103002
3	https://onlinecourses.nptel.ac.in/noc21_me83

Sr. No.	List of Experiments/Drawing sheets	
1	Prepare 2D airfoil CAD model by importing airfoil coordinates	CO1
2	Prepare 3D CAD model of wing structure with 2D airfoil by extrusion	CO1
3	Prepare 3D CAD model of tail plane structure with 2D airfoil by extrusion	CO2
4	Prepare 3D CAD model of a propeller with 2D airfoil by extrusion	CO2
5	Prepare 3D wireframe CAD model of fuselage structure	CO3
6	Prepare 3D wireframe CAD model of nose section	CO3
7	Prepare a 3D CAD models of engine mounts	CO4
8	Prepare 3D CAD models of landing gear components	CO4
9	Assemble landing gear components with assembly design tool keeping tolerances and fits in consideration	CO5
10	Assemble all the aircraft components with assembly design tools keeping tolerances and fits in consideration	CO5

CO	Course Outcomes	CL	Class Session
CO1	**Understand** aerospace drawing standards, materials, and processes.	2	4
CO2	**Implement** design principles to create functional 2D and 3D representations of aircraft parts and their assemblies.	3	4
CO3	**Apply** GD&T and manufacturing principles to precise drawings.	3	4

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Program: B.Tech First Year (AE/CE/ME)

Semester-I | **CNC Machine and Programming-Lab (BME41102)**

Teaching Scheme	
Lectures	-
Practical	4Hrs/week
Total Credit	2(Pr)

Examination Scheme	
CT-1	-
CT-2	-
TA	25Marks
ESE	25 Marks
Total	50 Marks
Duration of ESE: 02Hrs 00Min.	

Course Objective:

1	To classify conventional machine tools such as lathes, milling machines, and machining centers, and explain the principles of metal cutting along with their key components and operational functions.
2	To analyze the development, classification, and operational characteristics of CNC machines, and differentiate them from conventional systems with emphasis on industrial applications and safety practices.
3	To design and simulate basic CNC programs by applying knowledge of coordinate systems, motion control types, machine components, and standard G and M coding conventions.

Course Contents

Unit I	**Introduction to metal cutting and material removal processes** - Overview and classification of conventional machine tools Lathe Machine: Types, major components, attachments, and accessories Milling Machine: Types, major components, attachments, and accessories ,Introduction to Machining Centers and their role in modern manufacturing
Unit II	**Introduction to CNC Technology and Machine Characteristics-** Evolution of Numerical Control (NC) technology - Comparison: Conventional, NC, CNC, and DNC machines - Classification of CNC machines based on control system and application - Advantages, limitations, and industrial applications of CNC - Characteristics of modern CNC machines: feed axes, rotary axes, path measuring systems (encoders) - Automatic tool changers (ATC) and tool magazines - Safety measures and best practices while using CNC machines
Unit III	**Construction, Systems, and CNC Programming Basics-** Structural components: machine bed, column, enclosure - Spindle and spindle drive units: types and working principles - Motion systems: ball screws, servo motors, LM guide ways - Control Systems: Machine Control Unit (MCU) – structure and functions - Auxiliary systems: hydraulic and pneumatic systems (for chucking, tool changes, pallet handling) - CNC Coordinate systems: Absolute vs Incremental - Axis conventions for turning and milling - Reference points: machine zero, program zero, home position - Types of motion control: PTP, Linear, Circular Interpolation - Introduction to basic CNC part programming (G and M Codes)

Text Books

T.1	CNC Machines, HMT, Bangalore, New age International Limited
T.2	CNC Programming made easy , Binit kumar Jha, Vikas publishing house Pvt. Ltd.
T.3	CNC Machines Pabla B. S. & M. Adithan ,New age International Limited
T.4	CAD/CAM Principles Applications, P. N. Rao, Tata McGraw Hill

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Reference Books	
R.1	CAD/CAM Computer Aided Design and manufacturing, Groover, Zimmers, Pearsons
R.2	Computer Numerical Control-Turning And Machining Centres, Quesada Robert, Prentice Hill India, New Delhi
R.3	Advance Manufacturing Process, Jain V.K., Allied Publisher Mumbai
R.4	Mechatronics , HMT Bangalore , Tata McGraw Hill
Useful Links	
1	https://nptel.acin/courses/112105211/
2	https://www.autodesk.com/solutions/cnc-machining-software
3	http://www.iitp.ac.in/—athakur/courses/MHSO1/ModuleIV/CNC.pdf

Sheet No.	List of Experiments/Drawing sheets	
1	Identify and explain components and accessories of a lathe and milling machine	CO1
2	Classify different types of machining operations using lathe and milling	CO1
3	Compare conventional, NC, CNC, and DNC systems using case examples	CO2
4	Demonstrate the features and safety procedures of a modern CNC machine	CO2
5	Identify and trace feed and rotation axes using CNC machine control panel	CO2
6	Disassemble and assemble spindle and ball screw systems (virtual/physical)	CO3
7	Study and simulate the working of Machine Control Unit (MCU) using simulation software	CO3
8	Identify and set coordinate systems (absolute/incremental) on CNC machine tools	CO3
9	Develop a basic CNC part program for turning operation (facing + turning + chamfering)	CO3
10	Simulate and execute any CNC machine program.	CO3

CO	Course Outcomes	CL	Class Session
CO1	**Understand** the working principles, components, and classifications of conventional machine tools such as lathes and milling machines.	2	4
CO2	**Apply** various CNC technologies and machine types by comparing their features, control systems, and industrial applications.	3	4
CO3	**Implement** basic CNC part programs using G and M codes by applying knowledge of coordinate systems and machine motion behavior.	3	4

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Program: B. Tech First Year (AE/CE/ME)

Semester-I | **Building Maintenance-lab: BCE41103**

Teaching Scheme		Examination Scheme (Th)		Examination Scheme (P)	
Theory (Th)	-	-	-	-	-
Practical (P)	4Hrs/week	-	-	-	-
Total Credits	**2**	-	-	**TA**	25 Marks
-			-	**ESE**	25 Marks
			-	**Total Marks**	50 Marks

Course Objectives:

1	Describe basics of building services.
2	Provide Lighting and Ventilation provisions
3	Prepare electrical services requirement and Layout of a given building

Course Contents

Unit I	**Building Services: –** Water Supply, Wastewater, and Plumbing Introduction to Building Services: Definitions, Objectives, Uses, and Applications for Different Building Types, Classification and Selection of Building Services, Water Supply System: Pipe Sizing, Schemes of Water Supply and Wastewater, Wastewater System, Venting – Plumbing Systems, Inspection and Testing of Water and Wastewater Systems.
Unit II	**Lighting, Ventilation & Electrical Services:-**Lighting: Natural and Artificial Lighting – Principles and Factors, Arrangement of Luminaries, Distribution of Illumination, Utilization Factors, Ventilation: Necessity and Types – Natural and Mechanical, Design Factors for Ventilation Systems, Electrical Services: Technical Terms and Symbols, Electrical Accessories and Wiring Types, Types of Insulation.
Unit III	**Fire Protection, Acoustics & Green Buildings:** Causes, Types, Effects of Fire, Fire Safety Measures and General Requirements (IS/NBC 2005), Fire-Resistant Materials, Fire Exits – Horizontal Exit, Roof Exit, Fire Lifts, External Stairs, Requirements for Good Acoustics, Sound Absorbents and Noise Control in Residential Buildings, Rainwater Harvesting, Concepts and Components of Green Buildings, Grey Water Treatment – Introduction, Significance, Components & Management.

Text Books

T.1	A text book on Building Services, R. Udaykumar, Eswar Press, Chennai
T.2	Building Services, S. M. Patil, Seema Publication, Mumbai Revised edition
T.3	Building Construction, Dr. B. C. Punmia, Laxmi Publications (P) Ltd., New Delhi
T.4	Building Construction, P. C. Varghese, PHI Learning (P) Ltd., New Delhi

Reference Books

R.1	National Building Code of India – 2005, Bureau of Indian Standards (BIS) New Delhi
R.2	Building Repair & Maintenance Management, P. S. Gahlot, CBS Publishers & Distribution (P) Ltd
R.3	Green Building: Guidebook for Sustainable Architecture, Michael Bauer, Springer (2010 edition)

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Useful Links	
1	www.nptel.iitm.ac.in
2	www.bis.org.in/sf/nbc.htm

Sr. No.	List of Experiments/Drawing sheets	
1	To prepare a plumbing system layout plan for a multistorey residential building	CO 1
2	To prepare Lighting and Ventilation plan for a commercial complex	CO 2
3	To prepare electrical layout plan for a given building	CO 3
4	To prepare a plan for fire safety measures for a given multi storey building	CO 4
5	Suggest noise control methods for a given commercial complex	CO 5
6	To prepare a grey water management system for a residential complex	CO 1, 5
7	To prepare rain water harvesting layout plan for a building	CO 5
8	To prepare a case study for the fire-fighting services for residential/commercial building in the nearby area.	CO 4
9	Visit a residential building/commercial building under construction and prepare layout for electrical, water supply, sanitary and related allied services of civil engineering and prepare site visit detailed report	CO 1 to 5
10	Students in groups of no more than five will each receive a Seminar topic. The students must prepare, present, and defend a report along with an associated Power Point presentation.	CO 1 to 5

CO	Course Outcomes	CL	Lab Sessions
CO 1	**Interpret** the classification, selection, and functional design of water supply, wastewater, and plumbing systems in buildings, including pipe sizing and inspection procedures.	2	4
CO 2	**Apply** the principles of lighting, ventilation, and electrical design to create effective service layouts for different building types.	3	4
CO 3	**Explain** fire safety guidelines, acoustic requirements, and green building concepts including rainwater harvesting and greywater management.	3	4

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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 (AE/CE/ME)

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

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 utilize consistency of system of equations.
2	To make students acquainted with advance techniques to evaluate integrals.
3	To 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.

Course Contents

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.**

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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.**
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/

CO	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	**Inspect** scientific data, use proper curve fitting and find correlation, regression of variables.	3	9

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Department of Basic Sciences and Humanities

Program: B.Tech First Year (AE/CE/ME)

Semester-II | **Solid state Physics & Optics : (BSH41206)**

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**	25 Marks
Duration of ESE: 3Hrs			60 Marks	**ESE**	25 Marks
		Total Marks	**100 Marks**	-	**50 Marks**

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

Course Objectives:

1. To show the strong conceptual understanding of Crystallography with their types and application in various engineering field.
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 optical fiber and laser with their application in engineering and medical field.

Course Contents

Unit I	**Crystallography:** Introduction, Classification of Crystal structure, Simple Cubic cell, Body Centered cubic cell, Face Centered cubic cell (SC, BCC, FCC), Elements of crystal, Unit cell and their types.Characteristics of Unit cell, Effective number of atoms per unit cell, atomic radius, nearest neighbor distance, coordination number, atomic packing factor, void space, density; Crystallographic planes and Miller indices, Bragg's law of diffraction and its equation.
	Activity 1: Model making of different structure(SC,BCC,FCC) **Activity 2: Open Book Test**
Unit II	**Electron Ballistics & 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: Game Pedagogy - Crossword Puzzle of Electron Ballistics & Electron Optics. **Activity 2: Poster Presentation**
Unit III	**Semiconductor Physics:** Introduction, Intrinsic semiconductors and Extrinsic Semiconductor, PN-Junction diode, Hall effect & voltage, Hall coefficient, its application, Zener diode, LED, 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 Application.**

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Unit IV	**Interference in thin film:** Introduction, thin film, Plane Parallel thin film, Wedge shaped thin film, Newton rings and its application, Antireflection coating.
	Activity 1: PPT on classification of Parallel thin film and Wedge-shaped thin film with their application. **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 1: Context based learning & document making based activity. **Activity 2: Multiple choice questions on LASER**
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	Modern Physics: Theraja B.L., Reprint 2nd Edition, S. Chand & CO, New Delhi.
R.2	Solid State Physics: Dekker J., Reprint1st Edition, Mc Millan 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 (Solid State Physics & Optics Lab-BSH41210)		
1	Determination of lattice constant and atomic packing fraction of simple cubic structure.	CO1
2	Determination of e/m ratio of an electron by Thomson method.	CO2
3	Determine the Cut in Voltage and Dynamic Resistance of P-N Junction Diode in Forward and Reverse Biased.	CO3
4	Determine the Break Down Voltage and Dynamic Resistance of Zener Diode	CO3
5	Determine the ripple factor and rectification efficiency by Half Wave and Full Wave Rectifier using CRO.	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	Calculate 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	Experiments in Engineering Physics: M.N. Avadhanulu, A. A.Dani, 2nd Edition S. Chand (G/L) & Company Ltd, New Delhi.
T.2	A textbook of Practical Physics: SamirKumarGhosh,1stEdition,New Central Book Agency, Kolkata.
Reference Books	
R.1	Engineering Physics: Dattu Joshi, Tata Mc Graw Hill Education, NewDelhi.
R.2	A text book of Engineering physics: Dr. M. N. Avadhanulu, Dr. P.G. Kshirsagar, S. Chand Publication.

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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 Crystal geometry, the behavior of solids and different characteristics of cubic crystal structure.	3	9
CO2	**Illustrate** the concept of motion of charged particle in electric field, magnetic field and cross configured field.	3	9
CO3	**Explain** p n junction diode, Zener diode, Light emitting diode and transistor with their application in engineering field.	4	9
CO4	**Analyze** the concept of interference 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 (AE/CE/ME)

Semester-II | **Principle of Electrical Engineering: (BEE41201)**

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	**100Marks**	-	**50Marks**

Pre-Requisites: NA.

Course Objectives:

1.	To understand and analyze basic electric and magnetic circuits.
2.	To study the working principles of electrical machines and power converters.
3.	To introduce the components of low-voltage electrical installations.

Course Contents

Unit I	Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff current and voltage laws, analysis of simple circuits with dc excitation Superposition Theorem.
Unit II	Representation of sinusoidal waveforms, peak and RMS values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance. Three-phase balanced circuits, voltage and current relations in star and delta connections
Unit III	Magnetic materials, BH characteristics, series and parallel magnetic circuits, ideal and practicaltransformer, equivalent circuit, losses in transformers, regulation and efficiency. Autotransformer and three-phase transformer connection
Unit IV	Introduction to Power Generation Thermal Hydro, Nuclear, Wind, Solar with Block SchematicPresentation Only. Single line diagram for Generation Transmission, Distribution through different Voltage levels. Low voltage distribution system Overhead Underground Single Phase Three Phase. Basic operation of UPS Invertors Block schematic representation.
Unit V	Protective Devices: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing.Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup. Illuminance: Lamps- fluorescent, CFL, LED. Electrical measuring instruments principle and applications energy meter, megger, tong tester.

Text Books

T.1	D. P. Kothari and I. J. Nagrath, “Basic Electrical Engineering”, Tata McGraw Hill, 2010.
T.2	D. C. Kulshreshtha, “Basic Electrical Engineering”, McGraw Hill, 2009.
T.3	L. S. Bobrow, “Fundamentals of Electrical Engineering”, Oxford University Press, 2011.

Reference Books

R.1	E. Hughes, “Electrical and Electronics Technology”, Pearson, 2010.
R.2	Vincent Del Toro, “Electrical Engineering Fundamentals”, Prentice Hall India, 1989

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Useful Links	
1	https://digimat.in/nptel/courses/video/108105112/L01.html
2	https://archive.nptel.ac.in/courses/108/105/108105112/
3	https://archive.nptel.ac.in/courses/108/105/108105053/

LIST OF EXPERIMENTS(**Principle of Electrical Engineering Lab: BEE41202)**		
1	Verification of Kirchhoff's laws (KVL & KCL) for given network.	CO1
2	Verification of Superposition theorem for given network.	CO2
3	Determination of resistance and inductance of choke coil	CO2
4	Execute RLC series circuit operation and to plot Phasor diagram for it.	CO3
5	Determination of Permeability & Saturation point for given magnetic material	CO3
6	Detection of core losses and copper losses by performing open circuit test and short circuit test on single phase transformer	CO3
7	Perform direct loading test on single-phase transformer to determine its efficiency & voltage regulation.	CO3
8	Investigate the performance and efficiency of a UPS and an inverter in providing backup power during utility power interruptions.	CO4
9	Explore the construction and working principles of a separately excited DC motor, including the role of field windings and armature.	CO4
10	Explore the principles of insulation resistance measurement with a megger and clamp-on current measurement with a tong tester.	CO5

Text Books	
T.1	A Text Book of Electrical Technology: B. L. Thareja and A. K. Thareja, S. Chand Publication (Volume I, II & III). 2011
T.2	Rashid M.H, "Power Electronics: Circuits Devices and Applications", 3rd Edition, Pearson, 2011.

Reference Books	
R.1	E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
R.2	D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.

Useful Links	
1	https://nptel.ac.in/courses/117/106/117106034/
2	https://nptel.ac.in/courses/108108076/
3	https://nptel.ac.in/courses/108105062/

CO	Course Outcomes	CL	Class Sessions
CO 1	**Describe** Kirchhoff's current and voltage laws to analyze and solve complex DC electrical circuits.	2	9
CO 2	**Interpret** single-phase and three-phase AC circuits, calculate power parameters, and make informed decisions regarding their applications.	2	9
CO 3	**Illustrate** and optimizing transformers and magnetic circuits with a focus on factors such as material characteristics, losses, and connection configurations.	3	9
CO 4	**Construct** various electric machines, including three-phase induction motors, separately excited DC motors, and synchronous generators.	3	9
CO 5	**Analyze** the types of wires and cables commonly used in electrical installations, considering their specifications and applications.	4	9

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Semester-II | **Engineering & Computer Graphics: BME41202**

Teaching Scheme		Examination Scheme(Th)		Examination Scheme(P)	
Theory(Th)	2 Hrs/week	**CT-I**	07 Marks	-	-
Practical (P)	-	**CT-II**	08 Marks	-	-
Total Credits	**2 (Th)=2**	**CA**	05 Marks	-	-
Duration of ESE:3 Hrs		**ESE**	30 Marks	-	-
		Total Marks	**50 Marks**	-	-

Pre-Requisites: Basics of drawing such as dimensions, scale, angle, projection

Course Objectives:

1	To apply fundamental engineering drawing conventions, including BIS standards, line types, and dimensioning techniques, and construct various engineering curves to solve practical problems.
2	To analyze and generate orthographic projections of points, lines, planes, and basic solids in first-angle projection, demonstrating an understanding of spatial relationships.
3	To Create orthographic and sectional views of machine parts and convert them into accurate isometric drawings.

Unit I	**Fundamentals of Engineering Drawing & Curves**: Introduction to Engineering Drawing: Importance and scope in engineering disciplines, Introduction to BIS (Bureau of Indian Standards) drawing conventions, Drawing Instruments and Sheet Layout: Types and uses of drawing instruments (drawing board, T-square, set squares, compass, dividers, etc.),Standard sheet sizes (A-series), sheet layout, title block Types of Lines and Dimensioning: **Classification of lines as per BIS** – visible, hidden, center, construction, and section lines Methods and conventions of dimensioning – unidirectional and aligned methods Engineering Curves: Construction and applications of conic sections: Ellipse, Parabola, Hyperbola **Special curves**: Cycloid, Involute (of a circle), Logarithmic Spiral and Archimedean Spiral Practical applications of curves in engineering components
	Activity 1: Hands-on sketching exercise—constructing different types of lines and applying dimensioning standards on practice templates. **Activity 2**: Problem-solving session—construction of various engineering curves using geometrical methods and templates.
Unit II	**Principles of Orthographic Projection:** Theory and terminology of projection, First angle vs. third angle projection methods (emphasis on first angle),Projection of Points and Lines: Projections of points located in different quadrants, Projections of lines inclined to one or both reference planes (horizontal and vertical planes), Projection of Planes: Projection of plane figures (circle, triangle, square, rectangle, pentagon, hexagon, etc.) inclined to both H.P. and V.P. **Projection of Solids:** Projection of standard 3D solids (cube, prism, pyramid, cylinder, cone) Axis inclined to one reference plane and parallel to the other

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	Activity 1: Group activity—projection of a line and plane with various inclinations using AutoCAD or manual drafting. **Activity 2**: Visualization quiz—identifying true length, angle, and shape from given orthographic views.
Unit III	Orthographic Projections of Machine Components: Generation of multiview (front, top, side) orthographic drawings from pictorial representations, Use of first angle projection method, Application of sectional views for clarity in representation Isometric Drawing: Understanding isometric axes and planes, Creation and use of the isometric scale, Conversion of orthographic views into isometric views or projections, Interpretation of 2D technical drawings into 3D representations
	Activity 1: Lab session—generation of multiview orthographic projections of simple machine components using manual drafting and then replicating in CAD software. **Activity 2**: Practical exercise—Development of isometric views from given orthographic projections using isometric grid paper and CAD tools.
Textbooks	
T.1	Elementary Engineering Drawing - N.D. Bhatt, Charotor Publishing house, Anand, India.
T.2	Engineering Drawing - D. A. Johle, 1st Edition, 2017, Tata McGraw-Hill Publishing Co. Ltd.
T.3	Engineering Graphics with an introduction to AUTOCAD - A. R. Bapat, 6th reprint Edition, 2012, Allied Publishers, New Delhi.
T.4	Engineering Graphics with AutoCAD - D. M. Kulkarni, A. P. Rastogi, A. K. Sarkar, Revised Edition, 2010, PHI Publication.
T.5	Engineering Drawing - R.K. Dhawan, 1st Edition, 2012, S Chand Publications
T.6	Engineering Drawing, M.B. Shah, B.C. Rana, 2nd Edition, 2009, Pearson Publication
Reference Books	
R.1	Engineering Graphics by P.J.Shah, Revised edition 2014, S Chand and Company ltd., New Delhi, India.
R.2	Engineering Drawing by BasantAgarwal and C.M. Agarwal, 2nd edition 2015, Tata Magraw Hill Publication Company ltd., and New Delhi, India.
R.3	Fundamentals of Engineering Drawing - Luzadder Warren J, Duff John, 11th Edition, 2012, PHI Publications.
R.4	Machine Drawing -N.D. Bhatt, 46th Edition, 2014, Charotar Publishing house, Anand, India.
Useful Links	
1	https://nptel.ac.in/courses/112/103/112103019
2	https://nptel.ac.in/courses/112/102/112102304/
3	https://nptel.ac.in/courses/112/105/112105294/

CO	Course Outcomes	CL	Class Sessions
CO1	**Apply** BIS standards and drafting techniques to construct technical drawings and engineering curves using appropriate instruments.	3	8
CO2	**Analyze** and produce orthographic projections of points, lines, planes, and solids based on their spatial orientation with reference planes.	4	8
CO3	**Categorize** multiview orthographic and isometric drawings of simple machine components by interpreting 2D and 3D views using manual or CAD tools.	**4**	9

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Semester-II | **C Language Lab (BIT41205)**

Teaching Scheme	
Practical	2 Hrs/week
Tutorial	-
Total Credits	1

Examination Scheme	
CT-1	-
CT-2	-
CA	25 Marks
ESE	25 Marks
Total	50 Marks
Duration of ESE:	-

Course Objective:

1	To understand C language fundamentals and represent solutions using algorithms and flowcharts.
2	To apply operators and expressions to perform logical and arithmetic operations in C.
3	To Write and execute C programs using control structures and standard I/O functions.

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.
Unit II	**Operator and Expression**: Arithmetic, Relational, Logical, Assignment, Increment and Decrement, Conditional operator, Bitwise operators, sizeof operator, Arithmetic Expression, Evaluation expression. **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.
Unit III	**Statements-Selection statements (Decision Making):** IF, IF-ELSE, Nested IF-ELSE and switch statements with examples, Repetition statements (loops)- while, for, do-while statements with examples, Unconditional statements- break, continue, goto statements with examples.

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.

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.

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Useful Links	
1	https://youtu.be/-wv-OERJK3M
2	https://youtu.be/IdXrCPzNnkU
3	https://youtu.be/5AHRXOtn9bY

Sr. No.	List of Experiment	
1	Design a program to calculate simple interest(SI) for a given principal (P), time (T), and rate of interest (R) (SI = P*T*R/100)	CO1
2	Write a program that declares Class awarded for a given percentage of marks, where mark <40%= Failed, 40% to <60% = Second class, 60% to <70%=First class, >= 70% = Distinction. Read percentage from standard input.	CO1
3	C program to read roll number and marks from user and display it on screen.	CO1
4	Implement computational problems using arithmetic expressions	CO2
5	C program to print 1 to 10 numbers using for loop.	CO2
6	C Program to check Armstrong number using while loop	CO3
7	Program to find greatest among 3 numbers using decision making statement	CO3
8	Write a C program to construct a pyramid of numbers as follows (using Looing Concept) a) 1 2 2 3 3 3 4 4 4 4 b) * * * * * * * * * *	CO3
9	Implement Problems involving if-then-else structures	CO3
10	Micro Project	CO3

CO	Course Outcomes	CL	Class Session
CO1	**Understand** the problem and build an algorithm/flowchart to solve it	2	4
CO2	**Illustrate** basic structure of C also perform the compilation execution process.	3	4
CO3	**Execute** the C code to perform the operation using the decision making statement	3	4

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Department of Basic Sciences and Humanities

Program: B.Tech First Year (AE/CE/ME)

Semester-II — **Computer Aided Drawing-Lab: BCE41201**

Teaching Scheme		Examination Scheme (Th)		Examination Scheme (P)	
Theory (Th)	-	-	-	-	-
Practical (P)	4 Hrs/week	-	-	-	-
Total Credits	**2**	-	-	**CA**	25 Marks
-		-	-	**ESE**	25 Marks
		-	-	**Total**	**50 Marks**

Pre-Requisites: NA

Course Objectives:

1.	To understand the principles and importance of core building services such as water supply, lighting, ventilation, and waste management.
2.	To gain insights into environmental comfort systems including ventilation, acoustics, thermal insulation, and HVAC design.
3.	To explore modern building safety and automation systems including fire safety measures and smart controls.

Course Contents

Unit I	**Building Services** – Water, Waste, and Lighting Systems, Introduction to Building Services, Classification & Selection, Water supply and wastewater systems: planning, pipe sizing, venting, plumbing, Natural and artificial lighting systems: design principles, luminaries, illumination.
Unit II	**Ventilation, Acoustics & Thermal Comfort:** Importance and methods of natural and mechanical ventilation, Acoustics in buildings: sound properties, noise control, insulation techniques, Thermal insulation: heat transfer, insulating materials, comfort control.
Unit III	**Air Conditioning, Fire Safety & Building Automation:** Basics of HVAC and types of air conditioning systems, Fire safety systems: detection, alarms, fire-fighting equipment, Introduction to Building Automation: sensors, building management systems.

Text Books

T.1	Subhash C Sharma & Gurucharan Singh (2005), "Civil Engineering Drawing", Standard Publishers
T.2	Sham Tickoo Swapna D (2009), "AUTOCAD for Engineers and Designers", Pearson Education
T.3	Sikka, V.B. (2013), A Course in Civil Engineering Drawing, S.K.Kataria & Sons
T.4	Malik R.S., Meo, G.S. (2009) Civil Engineering Drawing, Computech Publication Ltd. New Asian

Reference Books

R.1	Engineering Graphics by P.J.Shah, Revised edition 2014, S Chand and Company ltd., New Delhi, India.
R.2	Engineering Drawing by Basant Agarwal and C.M. Agarwal, 2nd edition 2015, Tata Magraw Hill Publication Company ltd., and New Delhi, India.
R.3	Steven Harrington, "Computer Graphics", A Programming Approach, 2nd Edition
R.4	Rogar and Adams, "Mathematical Elements of Computer Graphics", McGraw Hill.

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Useful Links	
1	http://www.nptelvideos.in/2012/12/computer-aided-design.html
2	https://nptel.ac.in/courses/105/104/105104148/

Sheet No.	List of Experiments/Drawing sheets	
1	Introduction to various CAD commands, units with simple example.	**CO1**
2	Introduction to computer aided drafting & coordinate system.	**CO1**
3	Exercise on Layer, Dimension, Texting & Block etc.	**CO2**
4	Drawing of building components like walls, lintels, Doors, Windows and Staircases.	**CO2**
5	Drawing a plan of Building dimensioning using layers and Developing sections and elevations for given Single story buildings.	**CO3**
6	Drawing a plan of Residential & Commercial Building.	**CO4**
7	Introduction to 3D commands.	**CO4**
8	Draw Isometrics & Orthographic views drawing.	**CO5**

CO	Course Outcomes	CL	Class Session
CO1	**Summarize** foundational knowledge to design water, lighting, and waste systems in accordance with building requirements.	2	4
CO2	**Use** and integrate thermal, acoustic, and ventilation solutions for occupant comfort and energy efficiency.	3	4
CO3	**Apply** fire safety systems and building automation technologies to improve safety and management.	3	4

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TULSIRAMJI GAIKWAD-PATIL COLLEGE OF ENGINEERING & TECHNOLOGY
Wardha Road, Nagpur - 441108
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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

Program: B.Tech First Year (AE/CE/ME)

Semester-II	Professional Etiquette : BSH41105				
Teaching Scheme		Examination Scheme(Th)		Examination Scheme(P)	
Theory(Th)	-	CT-I	-	-	-
Practical(P)	2Hrs/week	CT-II	-	-	-
Total Credits	1(P)	CA	-	-	25 marks
Duration of ESE:		ESE	-	-	-
		Total 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. Roleplay 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

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

Reference Books

R.1	Seven Habits of Highly Effective People by Steven Covey
R.2	You Can Win by Shiv Khera
R.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 Session
CO1	**Understand** the key elements of personal grooming and appropriate dressing etiquette for academic and professional environments.	2	4
CO2	**Formulate** a personalized action plan for developing a growth mindset, setting realistic academic goals, and adopting positive habits for self-improvement.	3	4
CO3	**Demonstrate** between professional conduct across academic, social and virtual setting throw role play and discursion.	4	4

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Department of Basic Sciences and Humanities

Program: B.Tech First Year (AE/CE/ME)					
SEMESTER-II	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

Sr.No.	LIST OF EXPERIMENTS (Digital Wellness & Basic Communication Lab - BSH41104)	CO
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

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