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TULSIRAMJI GAIKWAD-PATIL
College of Engineering & Technology
Mohgaon, Wardha Road, Nagpur - 441 108

Bachelor of Technology
SoE and Syllabus 2024

(Department of Science and Humanities)

Vision of Institute

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

Wardha Road, Nagpur - 441 108 Accredited with NAAC A+ Grade
Approved by AICTE, New Delhi, Govt. of Maharashtra
(An Autonomous Institution Affiliated to RTM Nagpur University)

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

Group-B Semester – I AE/BT/CE/ECE/EE/ME/ECE

Mandatory 03-Weeks Induction Program in the First Semester for every student

SN	Sem	Type	BoS/ Dept.	Sub. Code	Subject	T/P	Contact Hours				Credits	% Weightage			ESE Duration Hours
							L	SL	P	Hrs		CT/IA	CA	ESE	
FIRST SEMESTER (GROUP-B)															
1	1	**BSC**	**S&H**	BSH31101	Algebra and Calculus	T	4	2	0	6	4	30	10	60	3
2	1	**BSC**	**S&H**	BSH31104	Chemical Process in Engineering	T	3	2	0	5	3	30	10	60	3
3	1	**BSC**	**S&H**	BSH31105	Chemical Process in Engineering Lab	P	0	0	2	2	1	25	-	25	-
4	1	**ESC**	**CE/BT/ ECE**	BCE31101 BBT31101 BEC31101	Engineering Mechanics/ Fundamentals of Biotechnology/Principles of Electronics Engineering and Digital Circuits	T	3	2	0	5	3	30	10	60	3
5	1	**ESC**	**ME**	BME31101	Engineering Workshop	P	0	0	2	2	1	25	-	25	-
6	1	**BSC**	**S&H**	BSH31X08	Introduction to Indian Knowledge System	T	2	2	0	0	2	14	6	30	2
7	1	**ESC**	**ME**	BME31X01	Engineering and Computer Graphics Lab	P	0	0	2	2	1	25	-	25	-
8	1	**PCC**	**EE/ME /CE/ AE/BT/ ECE**	BEE31101/ BME31102/ BCE31102/ BAE31101/ BBT31102/ BEC31102	Electrical Wiring and Installations / Computer AidedDesign/ CAD for Civil Engineers/ CAD for Aircraft Component/ Biotechnological Skill Lab/ Principles of Electronics Engineering Lab	P	0	0	4	4	2	25	-	25	-
9	1	**VSEC**	**CS**	BCS31102	Web Designing	P	0	2	4	4	2	25	-	25	-
10	1	**CC**	**S&H**	BSH31X09	Business Communication	P		0	4	4	2	25	-	25	-
TOTALFIRSTSEM							**12**	**10**	**18**	**34**	**21**	254	36	360	11
SECONDSEMESTER(GROUP-B)															
1	2	**BSC**	**S&H**	BSH31201	Differential Equation and Statistics	T	4	2	0	6	4	30	10	60	3
2	2	**BSC**	**S&H**	BSH31208	Solid State Physics & Optics	T	3	2	0	5	3	30	10	60	3
3	2	**BSC**	**S&H**	BSH31209	Solid State Physics & Optics -Lab	P	0	0	2	2	1	25	-	25	-
4	2	**ESC**	**EE**	BEE31202	Principles of Electrical Engineering	T	3	2	0	5	3	30	10	60	3
5	2	**ESC**	**EE**	BEE31203	Principles of Electrical Engineering-Lab	P	0	0	2	2	1	25	-	25	-
6	2	**ESC**	**IT**	BIT31203	Programming for Problem Solving using 'C'	T	2	1	0	3	2	14	06	30	2
7	2	**ESC**	**IT**	BIT31204	Programming for Problem Solving using 'C'-Lab	P	0	0	4	4	2	25	-	25	-
8	2	**VSEC**	**EE/ ECE/ ME/CE /AE/BT**	BEE31204/ BEC31203/ BME31201/ BCE31201/ BAE31201/ BBT31201	Power SIM / CNC Machine and Programing / Building Maintenance Lab/ Basics of Aircraft Design/ Environmental Biotechnology Lab	P	0	0	4	4	2	25	-	25	-
9	2	**AEC**	**S&H**	BSH31X04	Communication for Personality Development-Lab	P	0	1	4	5	2	25	-	25	-
10	2	**CC**	**S&H**	BSH31X05	Integrated Personality Development Course-I	P	0	0	4	4	2	25	-	25	-
TOTAL SECOND SEM							**12**	**08**	**20**	**40**	**22**	254	36	360	11

Course Category	BSC/ ESC (Basic Science Course/ Engineering Science Course.)	PCC (Programme Core courses	Multidisciplinary courses	VSEC (Skill Course)	Humanities Social Science& Management		Experiential Learning Courses	CC (Co-Curricular Courses)
					AEC(Ability Enhancement Course)	IKS(Indian Knowledge System)		
Credits SEM-I	08 / 05	02	--	02	--	02	--	02
Credits SEM-II	08 / 08	--	--	02	02	--	--	02
Cumulative Sum	16 / 13	02	--	04	02	02	--	04

PROGRESSIVE TOTAL CREDITS :21+22=43

			Aug, 2024	2.00	Applicable forAY 2023-24 Onwards
Chairperson	Dean Academics	Vice Principal	Principal	Date of Release	Version

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SCIENCE & HUMANITIES DEPARTMENT
T.G.P.C.E T. NAGPUR

Vice Principal
Tulsiramji Gaikwad-Patil
College Of Engineering
Technology, Nagpur

Principal
Tulsiramji Gaikwad-Patil
College Of Engineering &
Technology, Nagpur

Tulsiramji Gaikwad-Patil College of Engineering and Technology

Wardha Road, Nagpur-441108

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Program: B. Tech First Year Group-B(ME/EE/CE/AE/BT/ECE)

Semester-I | **Algebra & Calculus: BSH31101**

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	**100Marks**	-	-

Pre-Requisites: NA

Course Objectives:

1	To expose students to understand the basic importance of Differential Calculus and Integral Calculus.
2	To identify algebraic problems from practical areas and obtain the solution in certain cases.
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 introduce vector differential operator for vector function and important theorems on vector functions to solve engineering problems.

Unit I	**Integral Calculus:** Introduction to Gamma Function & Properties of Gamma Function, Introductionto Beta Function & Properties of Beta Function, Relation between Beta & Gamma Function,Leibnitz's rulefor differentiation under integral sign, Tracing of Cartesian and Polar curves.
Unit II	**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.
Unit III	**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.
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.
Unit V	**Vector Calculus:** Vector triple product, product of four vectors Scalar and vector field, Gradient of scalarpoint function, Directional derivative, divergence and curl of vector point function, Solenoidal and Irrotational motion. Vector Integration: Line and Surface Integral

Text Books

1	Higher Engineering Mathematics by Bali Lyenger (LaxmiPrakashan) 9th Edition
2	Advance Engineering Mathematics by Ervin Kreysizing 9th Edition
3	GB Thomas and R.L. Finney, Calculus and Analytic geometry 9th edition, Pearson, Reprint2002.

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Reference Books	
1	"Higher Engineering Mathematics" by Erwin Kreyszing 9th edition
2	A textbook of Engineering Mathematics by N.P. Bali, Manish Goyal, Laxmi Publication, Reprint 2010
3	Higher Engineering Mathematics by B. S. Grewal ,Khanna Publisher 35th edition .
Useful Links	
1	https://nptel.ac.in/courses/111/107/111107108/
2	https://nptel.ac.in/courses/111/105/111105121/
3	https://nptel.ac.in/courses/111/107/111107111/

CO	Course Outcomes	CL	Class Session
CO1	**Solve** improper integrals using beta, gamma functions	3	10
CO2	**Apply** the concept of matrices to check existence of solution of system of linear Simultaneous equation.	3	9
CO3	**Apply** the concept of maxima, minima and successive differentiation in analysis of engineering problems.	3	10
CO4	**Use** of Partial differentiation to Solve Jacobian and Chain Rule	3	10
CO5	**Determine** line and surface integral by using the concept of vector calculus.	3	9

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Program: B. Tech First Year Group-B(ME/EE/CE/AE/BT/ECE)

Semester-I | **Chemical Process in Engineering: BSH31104**

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)+2(P) = 5**	**CA**	10 Marks	**CA**	25Marks
Duration of ESE:3Hrs		**ESE**	60 Marks	**ESE**	25Marks
		Total Marks	**100Marks**	-	**50Marks**

Pre-Requisites: AICTE Bridge course, Energy sources, Thermodynamics and Equilibrium, Basics of Electrochemistry.

Course Objectives:

1.	To gain the knowledge of Energy sources, types & Application.
2.	To enable to students to upgrade the existing knowledge of water technology.
3.	To inculcate knowledge about construction material.
4.	To enlighten the students to the basic process of thermodynamics & laws.
5.	To gain the knowledge on properties of material and protection of material from corrosion.

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.
Unit II	**Construction Material:** Introduction of Construction Material, Microscopic constituent of cement & its role, manufacturing process of cement. Types of cement, properties and additives of cement, Ready-mix concrete.
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.
Unit IV	**Thermodynamics & Battery Technology:** Basics of thermodynamics, Laws of thermodynamic, Concept of Enthalpy and free energy, Introduction of batteries, Types of Batteries (Carbon-Zn, Alkaline-Zinc, NICAD, Lead Acid battery) H_2-O_2 Fuel cell and its applications.
Unit V	**Corrosion Sciences:** Introduction of corrosion, Electrode potential, redox reaction, EMF series, Galvanic series, Pilling-Bedworth Rule, Types of Corrosion (Wet and Dry Corrosion), Electrochemical corrosion, Method of protection by Design & Material selection and Cathodic protection.

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

Reference Books

R.1	Applied Chemistry: Narkhede & Bhake ,1st Edition. Das Ganu Prakashan
R.2	Engineering Chemistry: Krishnamurti & Madhav, 2nd Edition. Prentice Hall of India
R.3	Text book of Applied Chemistry: W.K Pokale & M.D Chaudhari1st Edition. Tech Max Publication

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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/

Sheet No.	List of Experiments (Chemical Process in Engineering -Lab : BSH31105)	
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 Apparatus. or By 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	Estimation of Amount of Zinc Deposited During Electroplating.	CO5
10	Estimation of rate of corrosion with different solutions.	CO5

CO	Course Outcomes	CL	Class Session
CO1	**Interpret** the types of Energy sources and its properties and application.	2	9
CO2	**Explain** the manufacturing of Cement, properties and different types of cement	2	9
CO3	**Differentiate** water pollution and its softening process.	2	9
CO4	**Illustrate** bulk properties and processes used in thermodynamics, Different types and application of batteries	3	9
CO5	**Predict** the causes of corrosion, its consequences and methods to minimize corrosion.	3	9

Text Books	
T.1	Applied Chemistry Lab O.P V irmani
T.2	Laboratory manual on Engineering Chemistry by Suddharani
T.3	Experiments and Calculations in Engineering Chemistry by S. Chand
T.4	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/

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Program: B. Tech First Year Group-B(ME/EE/CE/AE/BT/ECE)

Semester-I | **Engineering Mechanics: BCE31101**

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

Pre-Requisites: NA

Course Objectives:

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

Course Contents

Unit I	**Resolution & Composition of Forces:** Principles of Statics, Law of moments, Resultant and general force system, moment about a point and an axis, couple moment as free vector. Resolution of forces.
Unit II	**Equilibrium of Force system** Free body diagram, Resultant and Equilibrium of concurrent and parallel forces in space. Equilibrium of three forces in a plane space. Truss and beams – type of trusses, analysis of simple pin joints frames by method of joints and method of section, type of beams, type of load and type of end supports.
Unit III	**Centroid and Moment of Inertia:** 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, Principle axes and Mohr's circle of inertia.
Unit IV	**Kinematics:** Kinematics of rectilinear motion, motion curves, Newton's motion Law, Projectile, relative velocity.
Unit V	**Method of Momentum and D'Alembert's Principle:** Linear impulse momentums, consideration for system of particles, elastic impact of two bodies, direct central impact. Principle work energy method (expression based on center of mass)

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.

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Reference Books	
R.1	Vector Mechanics for Engineers Vol.-I and II, F. P. Beer and E. R. Johnston, Tata Mc- Graw HillPublication 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	**Apply** the forces on body**,** Force system, moment of force about any point, couple moment as free vector, resultant of two-dimensional distributed loads.	3	10
CO2	**Illustrate** Resultant and Equilibrium of concurrent and parallel forces	3	9
CO3	**Demonstrate** the centroid of composite figures and moment of inertia ofplane sections	3	10
CO4	**Illustrate** the Kinematics of rectilinear motion, motion curves, Newton's motion Law, and relative velocity.	3	10
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 Group-B(ME/EE/CE/AE/BT/ECE)

Semester-I | **Fundamentals of Biotechnology: BBT31101**

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

Course Objective:

1	To explore the various branches of biotechnology, including plant, animal, marine, agriculture, healthcare,industrial, pharmaceutical, and environmental biotechnology.
2	To understand the principles and applications of biotechnology in environmental management, biodegradation, bioremediation and Bio mining.
3	To analyse the role of enzymes used in textile industry, breweries and food supplements.
4	To obtain the biotechnological applications in food processing.
5	To evaluate the applications of biotechnology in human health and livestock improvement.

Course Contents

Unit 1	**Scope and Introduction to Biotechnology:** Introduction to Biotechnology, Definition o Biotechnology.Traditional and Modern Biotechnology. Overview of Branches of Biotechnology: Plant Animal Biotechnology, Marine Biotechnology, Agriculture, Healthcare, Industrial Biotechnology PharmaceuticalBiotechnology and Environmental Biotechnology.
Unit 2	**Environment:** Applications of Biotechnology in environment aspects: waste management,biodegradation of heavy metals, removing oil spills, air and soil pollution, bioremediation, bio mining.
Unit 3	**Industry**: Enzymes for textile industry, breweries and food supplements, single cell protein, vitamins,food processing cheese, yoghurt making.
Unit 4	**Food Biotechnology**: Overview of Biotechnological applications in enhancement of Food Quality, Quality Factors in Pre-processed Food, Microbial role in food products (Yeast and Bacterial based processand products).
Unit 5	**Human Health and livestock:** Applications in Human Health: Antibiotic production, Molecular diagnostics, vaccines and vaccine delivery, recombinant therapeutics, gene therapy, forensics. Applications in livestock improvement: transgenic animals, Increased milk production, artificial insemination, Invitro fertilization.

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Text Books	
1	Crueger Wand Crueger, A. 2000. Biotechnology: A textbook of Industrial Microbiology. 2nd edition. Panima Publishing Co. New Delhi.
2	Eckert, W.G. and Wrightin, R.K. 1997. Introduction to Forensic Sciences. 2nd Edition, CRC Press.
3	McGregor, C.W.; Membrane separation in Biotechnology; Marcel Dekker, Inc, New York.
Reference Books	
1	Hans-Joachim Jordening and Jeset Winter, 200s. Environmental Biotechnology Concepts and Applications
2	Microbiology: Michael J. Pelczar Jr., E. C. S Chan, Noel R. Krieg
3	Patel, A.H.1996.Industrial Microbiology.1st edition, Macmillian India limited
Useful Links	
1	https://nptel.ac.in/courses/102103045
2	https://sist.sathyabama.ac.in/sist_coursematerial/uploads/SBTA1304.pdf
3	https://onlinecourses.nptel.ac.in/noc21_bt41/preview

CO	Course Outcomes	CL	Class Session
CO1	**Illustrate** the significance of various branches of biotechnology.	2	9
CO2	**Explore** the knowledge about environmental aspects and role of enzymes in the Biotechnology.	2	9
CO3	**Competent** to apply the knowledge gained in fermentation technology.	3	8
CO4	**Compered** the knowledge gained in Food processing.	4	9
CO5	**Apply** the basic Biotechnology knowledge in Human Health and livestock improvement.	2	9

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

Semester-I | **Principle of Electronics Engineering & Digital Circuit : BEC31101**

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 Examine electrical circuits, R,L & C elements and voltage & current sources.
2.	To Implement Half Wave Rectifier , Full Wave Rectifier
3.	To Illustrate the number system, Number Base Conversion & applications.
4.	To Estimate Digital logics gates AND gate, OR gate, NOT gate, NAND gate & NOR gate, Ex-OR, Ex-NOR Symbol & truth table
5.	To Examine the Design procedure for Half adder, Full adder, Subtractor circuit. Multiplexer and Demultiplexer

Course Contents

Unit I	**Electrical circuits:** electrical circuits elements R,L & C Voltage & current sources , Kirchhoffcurrent &voltage law , analysis of simple circuits with dc excitation Superposition Theorem
Unit II	**Semiconductor Diodes:** Introduction , PN Junction diode, Characteristic sand Parameters, Diode Approximations ,DC Load Line analysis. **Diode Applications:** Introduction, Half Wave Rectifier, Full Wave Rectifier **Zener Diodes:** Junction Breakdown, Circuit Symbol and Package, Characteristics and Parameters, Equivalent Circuit, Zener Diode Voltage Regulator
Unit III	**Number system and codes:** Binary numbers, Number Base Conversion, octal & Hexa Decimal Numbers, BCD Conversion, signed and unsigned binary Basic Binary addition and subtraction, Complements, 1's and2's complement representation.
Unit IV	**Boolean Algebra :** Digital logics gates AND gate, OR gate, NOT gate, NAND gate& NOR gate. Ex-OR, Ex-NOR Symbol & truth table Universal Gates, Laws of Boolean algebra, De-Morgan's theorem Min term, Max term, POS, SOP, K Map, Simplification by Boolean theorems, don't care condition
Unit V	**Combinational Logic circuits:** Introduction, Design procedure Adders-Half adder, Full adder, Subtractorcircuit. Multiplexer and De multiplexer

Text Books

T.1	1. Electronic Devices and Circuits David A Bell, 5th Edition, Oxford, 2016
T.2	2. Digital Logic and Computer Design M.MorrisMano,PHILearning,2008ISBN-978-81-203-0417-8

Reference Books

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

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

LIST OF EXPERIMENTS (Quantum Physics & Optics-Lab: BSH31103)

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 Planck's constant.	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/115/106/115106128/
2	https://nptel.ac.in/courses/104/101/104101130/

CO	Course Outcomes	CL	Class Sessions
CO 1	**Analyze** electrical circuits and R L& C elements	3	9
CO 2	**Apply** Half Wave Rectification, Full Wave Rectification circuits	4	9
CO 3	**Solve** the number system, Number Base Conversion & applications.	3	9
CO 4	**Integrate** Digital logics gates & truth table	3	9
CO 5	**Examine** Half adder, Full adder, Subtractor circuit. Multiplexer and DE multiplexer.	4	9

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Tulsiramji Gaikwad-Patil College of Engineering and Technology
Wardha Road, Nagpur-441108
NAAC Accredited with A+ Grade
(An Autonomous Institute Affiliated to RTM Nagpur University, Nagpur)

Program: B. Tech First Year Group-B(ME/EE/CE/AE/BT/ECE)

Semester-I | **Engineering Workshop: BEE31101**

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

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.

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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/

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.	3	4
CO2	**Apply** carpentry tools for wooden joints, Simple exercise using jack plane.	3	4
CO3	**Build** 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.	2	4
CO5	**Understand** fasteners, its use, and selection of fastener as per the application.	2	4

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Program: B. Tech First Year Group-B(ME/EE/CE/AE/BT/ECE)

Semester-II | **Introduction to Indian Knowledge System: BSH31X08**

Teaching Scheme		Examination Scheme(Th)		Examination Scheme(P)	
Theory(Th)	2Hrs/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 explain** the information about the rich culture of the Indian Civilization & varied ancient knowledge systems.
2.	**To describe** the significance of the scientific concepts and achievements of ancient Indian scholars in fields of Science, Astronomy & Mathematics.
3.	**To illustrate** the traditional scientific, technical and architectural structures and their significance intraditional knowledge of Bharata.

Course Contents

UnitI	**Indian (Bhartiya) Civilization & Development of knowledge System** Discovery of the Saraswati River, the Saraswati-Sindhu Civilization, Traditional Knowledge System, The Vedas, Main Schools of Philosophy, Ancient Education System, the TakṣaśilāUniversity, the Nalanda University.
UnitII	**Science, Astronomy, and Mathematics** Concept of Matter, Life and Universe, Gravity, History and Culture of Astronomy, Sun, Earth, Moon, and Eclipses, Earth is Spherical and Rotation of Earth, Indian ancient Mathematics.
UnitIII	**Engineering, Technology, and Architecture** Pre-Harappan and Sindhu Valley Civilization, Social & Economic Life, Metallurgy, EngineeringScience and Technology in the Vedic Age and Post-Vedic Records, Ancient Architecture.

Text Books

1	Introduction to Indian Knowledge System;Concepts & Applications, by B. Mahadevan, Vinayak Rajat Bhat, Nagendra Pavana R.N. Eastern Economy Edition, PHI Learning PVT LTD, Delhi (2022)
2	A New Look into Social Sciences, by S. Shabbir, A.M. Sheikh, Jaya Dwadashiwar, S. Chand & Company LTD, Ramnagar, New Delhi-110055 (2006)

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Reference Books	
1	Encyclopedia of Indian History (from early times to the present)
2	Ancient Indian Architecture (From Blossom To Bloom), by Sanjev Maheshwari & Rajeev Garg, (2016)
3	Science in Ancient India: Reality versus Myth, by Breakthrough Science Society (BSS) (2020)
Useful Links	
1	**https://swayam-indian-knowledge-system-iks-concepts-and-applications-in-engineering-199649**
2.	**https://iksindia.org/**

	Course Outcomes	CL	Class Session
CO1	Students will be able **to explain** the information about Indian (Bhartiya) Civilization & Development of Knowledge System.	2	10
CO2	Students will be able **to describe** the significance of Science, Astronomy and Mathematics in Indian Knowledge System.	2	10
CO3	Students will be able **to illustrate** the structures of Engineering, Technology and Architecture in Indian Knowledge System.	3	10

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Program: B. Tech First Year Group-B(ME/EE/CE/AE/BT/ECE)

Semester-I | **Engineering and Computer Graphics Lab: BME31X01**

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

Pre-Requisites: NA

Course Objectives:

1.	To develop drawing using bureau of Indians standers (BIS).
2.	To impart the knowledge on the projection of line, plane and solids.
3.	To develop the computer based design of vectors, graphic elements.
4.	To make the students understand the Polygon, segments.
5.	To utilize matrix transformation, windowing & clipping

Course Contents

Unit I	**Engineering Curves:** Ellipse, Parabola, Hyperbola (Minimum four curves) Define: Cycloid, Involute, Archimedean Spiral.
Unit II	**Projections of Lines**: Basics of Orthographic Projection. Projections of lines are inclined to one & parallel to other reference plane. (Minimum four problems) **Projections of Planes**: Basics of Orthographic Projection. Projections Plane is inclined to one & parallel to other reference plane. (Minimum four problems)
Unit III	**Line generation:** Points lines, Planes, Pixels and Frame buffers, vector and character generation. **Graphics Primitives:** Display devices, Primitive devices, Display File Structure, Display control text.
Unit IV	**Polygon:** Polygon Representation, Entering polygons, Filling polygons. **Segments:** Segments table, creating deleting and renaming segments, visibility, image transformations.
Unit V	**Transformations:** Matrices transformation, transformation routines, displays procedure. **Windowing and Clipping:** Viewing transformation and clipping, generalize clipping, multiple windowing.

Text Books

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	Rogers, "Procedural Elements of Computer Graphics", McGraw Hill
T.4	Asthana, Sinha, "Computer Graphics", Addison Wesley Newman and Sproul, "Principle of Interactive Computer Graphics", McGraw Hill

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.

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R.3	Steven Harrington, "Computer Graphics", A Programming Approach, 2nd Edition
R.4	Rogar and Adams, "Mathematical Elements of Computer Graphics", McGraw Hill.
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/

Sheet No.	**List of Experiments/Drawing sheets**	
1	Drawing of Engineering Curves (Minimum four curves)	**CO1**
2	Drawing of Projections of Lines (Minimum two problems) & Projections of Planes (Minimum two problems)	**CO2**
3	Drawing of Projections of solids (Minimum two problems)	**CO3**
4	Orthographic Views (Minimum two problems)	**CO4**
5	Implementation of line generation using slope's method, DDA and Bresenham's algorithms.	**CO5**
6	Implementation of circle generation using Mid-point method and Bresenham's algorithm.	**CO1**
7	Implementation of ellipse generation using Mid-point method.	**CO2**
8	Implementation of polygon filling using Flood-fill, Boundary-fill and Scan-line algorithms.	**CO3**
9	Implementation of 2D transformation: Translation, Scaling, Rotation, Mirror Reflection and Shearing (write a menu driven program).	**CO4**
10	Implementation of Line Clipping using Cohen-Sutherland algorithm and Bisection Method.	**CO5**

CO	**Course Outcomes**	**CL**	**Class Session**
CO1	**Sketch** the engineering curves using basics drawing skills.	3	6
CO2	**Apply** the knowledge of projection, methods to prepare the drawingfor line and plane	3	6
CO3	**Apply** the computer based design of vectors, graphic elements.	3	6
CO4	**Develop** the students understand the Polygon, segments.	3	6
CO5	**Interpret** matrix transformation, windowing & clipping	3	6

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Program: B. Tech First Year Group-B(ME/EE/CE/AE/BT/ECE)

Semester-I | **Electrical Wiring and Installations : BEE31101**

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

Pre-Requisites: NA

Course Objectives:

1.	To impart the basic knowledge of electrical and electronics equipment used in the electrical Engineering laboratory.
2.	To give hands on training and practice to students for use of various equipment & tools used in electrical Engineering laboratory.
3.	Students will understand all the fundamental concepts involving electrical & electronics Engineering

Course Contents

Unit I	Various electrical & Electronics devices used in laboratory, their types & ratings, electronics components fabrication on PCB boards, material used for soldering, use of soldering iron
Unit II	Types of winding used in ceiling fan, concept of auxiliary winding, use of condenser in torque generation, types of switching circuits used, switches & its types
Unit III	Types of domestic wirings, concept of luminous flux, luminous Intensity, Candle power, illumination, Working Principle of Fluorescent lamp, Mercury Vapor, sodium vapor lamp & CFL
Unit IV	Application of diodes in half wave & full wave rectification, Rectifier circuits & its types, Inverters & its operating Principle
Unit V	Necessity of Earthing's, Fuses (Rewirable & HRC), MCB, ELCB & its applications, Basic Operation of UPS & its Types

Text Books

T.1	A textbook of Engineering physics: Dr. M. N. Avadhanulu, Dr. P. G. Kshirsagar, 8th Revised Edition, S. Chand Publication, New Delhi.
T.2	A textbook of Optics: N. Subrahmanyam, Brij Lal, M.N. Avadhanulu, 23rd Revised and EnlargedEdition2006,S. Chand Publication,NewDelhi.
T.3	Principles of Electronics :V. K. Mehta, Rohit Mehta, Multi colour Illustrate And Thoroughly Revised Tenth Edition 2006,S. Chand Publication,NewDelhi.

Reference Books

R.1	Modern Physics: Theraja B.L., Reprint 2nd Edition, S. Chand & CO, New Delhi.
R.2	Solid State Physics: Dekker J., Reprint1stEdition,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/

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Sheet No.	List of Experiments/Drawing sheets	
1	To **list** out & draw the symbols of various electrical devices.	**CO1**
2	To **demonstrate** soldering- de-soldering techniques.	**CO1**
3	To **execute** the wiring diagram of ceiling Fan.	**CO2**
4	To **carry** out stair case wiring of two-way switch	**CO2**
5	To **analyze** types of house Wiring i.e. Cleat, Casing-Caping and Conduit Wirings	**CO3**
6	To **compare** wiring diagram of Fluorescent Lamp, Sodium vapor & Mercury vapor Lamp.	**CO3**
7	To **illustrate** operation of Half – Wave & Full wave rectifier circuit	**CO4**
8	To **demonstrate** circuit and working of home inverter	**CO4**
9	To **analyze** circuit and working of UPS.	**CO5**
10	To **utilize** requirements of fuses, MCBs and importance of earthing	**CO5**

CO	Course Outcomes	CL	Class Session
CO1	**Implement** the use of various devices & **illustrate** the soldering-de-soldering process of elements on PCBs	3	4
CO2	**Utilize** the concepts of auxiliary winding & two-way switch in electrical engineering applications	3	4
CO3	**Differentiate** the domestic wiring methods & its procedures practically	4	4
CO4	**Analyze** the half wave rectifier, full wave rectifier & inverter circuit	4	4
CO5	**Use** the fundamental concepts of protective devices used in electrical Engineering applications.	3	4

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Program: B. Tech First Year Group-B(ME/EE/CE/AE/BT/ECE)

Semester-I | **Computer Aided Design (ME):BME31102**

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

Pre-Requisites:

Course Objectives:

1.	To demonstrate knowledge of the basic concepts and features of AutoCAD.
2.	To Understand the different types of 2D and 3D engineering drawings and their applications
3.	To learn sketch and transform it into graphics drawing.
4.	To create assembly drawings and bills of materials.
5.	To create both two- and three-dimensional designs/drawings using CAD software with title block.

Course Contents

Unit I	**Introduction**: Introduction to Computer Aided Drafting and Design. Product Development Life Cycle. Importance of CAD in mechanical design and analysis, Introduction to industry-standard CAD software (e.g., Solid Works, CATIA, AutoCAD), AutoCAD versions Interface, Page Setup, Co-ordinate System.
Unit II	**2D Drafting:** Draw toolbars: Line, Construction Line, Polyline, Rectangle, Arc, Ellipse, Spline, Divide, Measure, Donut, Wipeout, Hatch, and Gradient. Modify Toolbars: Move, Rotate, Scale, Erase, Copy, Mirror, Trim, Extend, Explode, Stretch, Offset, Array, Fillet, Chamfer, Edit – Polyline, Spline , Hatch, Array, lengthen, Join, Break. Shortcut keys for all commands.
Unit III	Annotation & Style Manager: Single line text, multi-line text, Dimensions, multileader, Text Style, Dimension style, Multileader style. Properties: Object Color, Line weight, Line type, List, Match Property, and Filter.
Unit IV	Layers, Blocks & Assembly: Layer property manager, Create Blocks & Attributes, Insert and save blocks. Assembly: Make a 2D parts with dimensions and to assemble the parts, Draw Title blocks and Bill of Material (BOM).
Unit V	Introduction to Isometric: Isometric wireframe drawing.

Text Books

T.1	Sham Tickoo Swapna D (2009), "AUTOCAD for Engineers and Designers", PearsonEducation.
T.2	Engineering Drawing - D. A. Johle, 1st Edition, 2017, Tata McGraw-Hill Publishing Co. Ltd.
T.3	Rogers, "Procedural Elements of Computer Graphics", McGraw Hill
T.4	Asthana, Sinha, "Computer Graphics", Addison Wesley Newman and Sproul, "Principle of Interactive Computer Graphics", McGraw Hill

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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.
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/

Sheet No.	List of Experiments	
1	Introduction to various CAD commands, units with simple example.	**CO1**
2	Study of capabilities of software for Drafting and Modeling – Coordinate systems (absolute, relative, polar, etc.) – Creation of simple figures like polygon and general multi-line figures.	**CO1**
3	Drawing of curves like parabola, spiral, involute using b-spline or cubic spline.	**CO2**
4	Exercise on Layer, Dimension, Texting.	**CO2**
5	Exercise on Blocks & Attributes.	**CO3**
6	Drawing of front view and top view of simple solids like prism, pyramid, cylinder, cone, etc, and dimensioning.	**CO3**
7	Drawing of simple assembly and disassembly, with title block .	**CO4**
8	Drawing of large assembly and disassembly, with title block.	**CO4**
9	Drawing isometric projection of simple objects.	**CO5**
10	Creation of 3-D models of simple objects	**CO5**

CO	Course Outcomes	CL	Class Session
CO1	**Execute** the basic commands of AutoCAD software. **Demonstrate** proficiency of using CAD software to create 2D sketches and 3D models of mechanical components, applying geometric constraints and dimensions effectively	3	6
CO2	**Apply** the knowledge of symbols & sign conventions to edit & modify AutoCAD Drawings.	3	6
CO3	**Use** annotation dimension style manager in accordance with properties	3	6
CO4	**Generate** engineering documentation, including assembly drawings and bills of materials, following industry standards, ensuring clear and accurate communication of design intent	3	6
CO5	**Develop** the students to understand the assembly and disassembly of mechanical components.	3	6

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Program: B. Tech First Year Group-B(ME/EE/CE/AE/BT/ECE)

Semester-I | **CAD for Civil : BCE31102**

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

Pre-Requisites: NA

Course Objectives:

1. Demonstrate knowledge of the basic concepts and features of AutoCAD.
2. Use the precision drafting tools in AutoCAD to develop accurate technical drawings.
3. Understand the different types of 2D and 3D engineering drawings and their applications

Course Contents

Unit I	**INTRODUCTION:** Introduction to concept of Auto CAD drawings, AutoCAD versions Interface, Unit Setting, Draw commands: Line command Poly line command Rectangle command, Interpretation of typical drawings, Planning drawings to show information concisely and comprehensively; optimal layout of drawings and Scales; Introduction to computer aided drawing, coordinate systems, reference planes. Commands: Initial settings, Drawing aids, Drawing basic entities, Drawing presentation norms and standards
Unit II	**MODIFY COMMANDS:** Move, Rotate, Scale, copy, Mirror, erase, trim, extend, Layers, Text and Dimensioning, Blocks. Commands: Initial settings, Drawing aids, Drawing basic entities, Drawing presentation norms and standards, Annotate Dimension Style Manager: Linear, Aligned, Radius Angular, Arc length, Save files Export pdf plot
Unit III	**ANNOTATE DIMENSION STYLE MANAGER**: Linear, Aligned, Radius Angular, Arc length. Object Properties: Color, Line type, Line weight, Properties.
Unit IV	**INTRODUCTION TO 3D INTERFACE:** Introduction to 3D interface, 3D coordinates, Isometric views: Isometric top, left, right Isometric diagrams, Isometric diagrams exercise.
Unit V	**PICTORIAL VIEW:** Principles of isometrics and perspective drawing. Perspective view of building. Fundamentals of Building Information Modeling (BIM)

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	Balagopal and Prabhu (1987), "Building Drawing and Detailing", Spades Publishing, KDR building, Calicut
R.2	Venugopal (2007), "Engineering Drawing and Graphics + AUTOCAD", New Age International Pvt. Ltd.
R.3	AutoCAD 2021 For Beginners (2020), Kishore Publisher
R.4	Randy H. Shih (2020) 1st edition, "AutoCAD 2021 Tutorial – First Level 2D Fundamentals", SDC

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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 Building dimensioning using layers and Developing sections and elevations for given Multi story buildings	**CO3**
7	Introduction to 3D commands.	**CO4**
8	Drawing a plan of Building in 3D views.	**CO4**
9	Draw Isometrics views drawing.	**CO5**
10	Draw Perspective views drawing.	**CO5**

CO	Course Outcomes	CL	Class Session
CO1	**Execute** the basic commands of AutoCAD software	3	8
CO2	**Apply** the knowledge of symbols & sign conventions to edit & modify AutoCAD Drawings	3	10
CO3	**Use** annotation dimension style manager in accordance with properties	3	10
CO4	**Draw** in accordance with 3D coordinates	4	8
CO5	**Implement** Single line drawings in Isometric & Perspective view	3	9

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Program: B. Tech First Year Group-B(ME/EE/CE/AE/BT/ECE)

Semester-I | **CAD for Aircraft Component: BAE31101**

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

Pre-Requisites: NA

Course Objectives:

1.	Develop proficiency of using industry-standard CAD software to create 2D and 3D models of aeronautical components and systems.
2.	Acquire the ability to perform basic analysis and simulations on aeronautical models to evaluate their structural integrity and aerodynamic performance.
3.	Learn to generate comprehensive engineering documentation, including assembly drawings and bills of materials, adhering to industry standards.
4.	Foster effective teamwork and communication skills through collaborative design projects, mirroring real-world engineering environments.
5.	Instill an appreciation for precision and attention to detail in aeronautical design, emphasizing the importance of accuracy in the aerospace industry.

Course Contents

Unit I	**Introduction to CAD/CAM:** Overview of computer-aided drafting and modeling (CAD/CAM) in aeronautics, Importance of CAD in aircraft design and analysis, Introduction to industry-standard CAD software (e.g., Solid Works, CATIA, AutoCAD), Basic software navigation and interface familiarity.
Unit II	**Basics of Sketcher:** Creating 2D sketches: Lines, arcs, circles, and polygons, Applying geometric constraints and dimensions, Practice exercises for 2D sketching, Introduction to layers and line types in CAD.
Unit III	**Drawing Techniques and Practices:** Advanced sketching techniques: Splines, ellipses, and text, Dimensioning and tolerance standards in aeronautical drawings, Creating orthographic projections of aeronautical components, Practice assignments on 2D drawing.
Unit IV	Sectional views and detail views in 2D drawings, Introduction to isometric and oblique drawings, Bill of Materials (BOM) generation, Examination of industry-specific 2D drawing examples.
Unit V	**3D Modeling of Aircraft Components:** Introduction to 3D modeling concepts, Extruding and revolving 2D sketches into 3D solids, Creating basic 3D shapes: Primitives and features, Practice exercises on 3D modeling, Parametric modeling and constraints, Assemblies and subassemblies: Bringing together multiple components, Exploded views and animation, Advanced 3D modeling techniques.

Text Books

T.1	Engineering Drawing and Design by David A. Madsen and David P. Madsen, CENGAGE Learning Custom Publishing, 6th ed., 2016.
T.2	Introduction to CATIA V5 Release 19 by Kirstie Plantenberg, SDC Publications, 2009.
T.3	Engineering Design Graphics with Autodesk Inventor by James D. Bethune, Macromedia Press, 2019.

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Reference Books	
R.1	Engineering Graphics & Design: With Demonstrations of AutoCAD, CATIA & ANSYS by Kaushik Kumar, Apurba Kumar Roy and Chikesh Ranjan, Vikas Publishing House, 2018.
R.2	Catia for Design and Engineering by David S. Kelley, Schroff Development Corporation, 2005.
R.3	Understanding CATIA: A Tutorial Approach by Kaushik Kumar, Chikesh Ranjan and J. Paulo Davim, CRC Press, 2021.
Useful Links	
1	https://archive.nptel.ac.in/courses/112/102/112102102/
2	https://nptel.ac.in/courses/112104031
3	https://onlinecourses.swayam2.ac.in/nou20_cs15

Sheet No.	List of Experiments/Drawing sheets	
1	Study of capabilities of software for Drafting and Modeling – Coordinate systems (absolute, relative, polar, etc.) – Creation of simple figures like polygon and general multi-line figures.	**CO1**
2	Drawing of a Title Block with necessary text and projection symbol.	**CO1**
3	Drawing of curves like parabola, spiral, involute using b-spline or cubic spline.	**CO2**
4	Drawing of front view and top view of simple solids like prism, pyramid, cylinder, cone, etc, and dimensioning.	**CO2**
5	Drawing front view, top view and side view of objects from the given pictorial views (eg. V-block, Base of a mixer, Simple stool, Objects with hole and curves).	**CO3**
6	Drawing of a plan of residential building (Two bed rooms, kitchen, hall, etc.)	**CO3**
7	Drawing of a simple steel truss.	**CO4**
8	Drawing sectional views of prism, pyramid, cylinder, cone, etc	**CO4**
9	Drawing isometric projection of simple objects.	**CO5**
10	Creation of 3-D models of simple objects and obtaining 2-D multi-view drawings from 3-Dmodel.	**CO5**

CO	Course Outcomes	CL	Class Session
CO1	**Demonstrate** proficiency of using CAD software to create 2D sketches and 3D models of aeronautical components, applying geometric constraints and dimensions effectively.	3	8
CO2	**Apply** the knowledge in acquiring skills of creating technically accurate 2D drawings of aircraft components and represent complex 3D components in 2D drawings.	3	9
CO3	**Generate** engineering documentation, including assembly drawings and bills of materials, following industry standards, ensuring clear and accurate communication of design intent.	3	9
CO4	**Collaborate** effectively with peers on aeronautical design projects, demonstrating strong communication skills, task delegation, and project management abilities.	3	9
CO5	**Develop** consistent high-quality CAD models and documentation, adhering to ethical and professional standards.	4	9

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Tulsiramji Gaikwad-Patil College of Engineering and Technology

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NAAC Accredited with A+ Grade

(An Autonomous Institute Affiliated to RTM Nagpur University, Nagpur)

Program: B. Tech First Year Group-B(ME/EE/CE/AE/BT/ECE)

Semester-I | **Biotechnology Skills Lab : BBT31102**

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

Pre-Requisites: NA

Course Objective:

1	To demonstrate the ability of identifying the presence of different adulterants in food sample
2	To examine the qualitative analysis of biomolecules
3	To acquire basic knowledge of vegetational analysis
4	To analyze samples with microscope
5	To gain hands on training to check purity of biomolecule

Course Contents

Unit I	**Introduction to Bio Products and their Adulteration:** Introduction and types of bio products, Identification of bioproducts (proteins, nucleic acids, carbohydrates, lipid cholesterol), Understanding the concept of adulteration, Common adulterants in bio products, Methods for detecting adulteration.
Unit II	**Qualitative Analysis of Chemicals and Bio molecules:** Principles of qualitative analysis, Practical techniques for qualitative analysis (e.g., chromatography, spectroscopy), Analysis of chemical composition in biological samples
Unit III	**Microscopy and Staining:** Microscopy fundamentals, Types of microscopes (bright field microscopy, phase contrast microscopy, confocal microscopy), Sample preparation for microscopy, Staining techniques for cells and tissues
Unit IV	**Vegetation Identification and Quadrat Method:** Vegetation identification techniques, Introduction to the quadrat method, Sampling techniques in ecology, Data collection and analysis using quadrats, Fieldwork and hands-on experience in vegetation identification
Unit V	**Quantitative Analysis of Biomolecules:** Principles of quantitative analysis, Practical methods for quantifying biomolecules (e.g., Spectrophotometer, ELISA, PCR), Data analysis and interpretation,

Text Books

1	Food Adulteration and Evaluation. S.S Nielsen, Springer 2017 3rd Edition
2	Bioanalytical Chemistry. SR Mikkelse, Willey 2016 2nd Edition
3	Methods in Ecology: A Laboratory Manual. GAF Hendry, JP Grime. Chapman & Hall, 1993

ReferenceBooks

1	Fundamentals of Light Microscopy and Electronic Imaging. DB Murphy and MW Davidson. Wiley-Blackwell 2012
2	Biological and Biochemical Spectroscopy. DL Andrews and AA Demidov. Kluwer Academic/Plenum Publishers 2002
3	Practical Manual of Biochemistry. S Sharma and R Sharma Medtech. 2016 2nd Edition

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UsefulLinks	
1	https://www.olabs.edu.in/?pg=topMenu&id=53
2	https://vlab.amrita.edu/?sub=3&brch=73&sim=208&cnt=1
3	https://vlab.amrita.edu/?sub=3&brch=63&sim=1091&cnt=4

Sheet No.	List of Experiments/Drawing sheets	
1	To determine adulteration in turmeric, wheat flour, ghee and milk	**CO1**
2	To detect the presence of sugar, albumin and ketone bodies in urine samples by Biochemical tests	**CO1**
3	To qualitatively analyze nitrate, carbonate and replaceable base deficiency in soil samples	**CO2**
4	To determination soil pH	**CO2**
5	To observe and detect cells with the help of microscope	**CO3**
6	To perform Gram staining to identify gram positive and gram negative bacteria	**CO3**
7	To identify various plants (Neem, Babool, Peeli Kaner, Tulsi, Chandani & Aak/ Madar)	**CO4**
8	To perform vegetational analysis by Quadrat method	**CO4**
9	To determine the concentration and purity of given DNA sample	**CO5**
10	To determine the concentration and purity of given RNA sample	**CO5**

	Course Outcomes	CL	Class Session
CO1	**Demonstrate** the ability of identifying the presence of different adulterants in food sample	3	9
CO2	**Examine** the qualitative analysis of biomolecules	3	9
CO3	**Acquire** basic knowledge of vegetational analysis	4	9
CO4	**Analyze** samples with microscope	4	9
CO5	**Obtain** hands on training for quantitative analysis of biomolecule	3	9

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Program: B. Tech First Year Group-B(ME/EE/CE/AE/BT/ECE)

Semester-II | **Web Designing: BCS31102**

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

Pre-Requisites:

Course Objectives:

1.	Aware about different tools for Web Programming.
2.	Demonstrate competency in the use of common HTML code.
3.	Able to design efficient client as well as server side scripts.
4.	Construct efficient web pages with CSS and JavaScript.
5.	Aware about different tools for Web Programming.

Course Contents

Unit I	**Web Foundations:** The Evolution 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, Colors - Color 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:- Netscape 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., Dreamtech 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,

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/

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	List of Experiment	CO
1	Demonstrate various tags in HTML.	CO2
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.	CO2
5	Create a page to show different character formatting (B, I, U, SUB, SUP) tags. **viz : log b m^p= p logb m**	CO2
6	Using HTML, CSS create a staggered animation for the elements of a list. • Set opacity: 0 and transform: translate X(100%) to make list elements transparent andmove them all the way to the right. • Specify the same transition properties for list elements, except transition-delay. • Use inline styles to specify a value for --i for each list element. This will in turn beused for transition-delay to create the stagger effect. • Use the :checked pseudo-class selector for the checkbox to style list elements. Set opacity to 1 and transform to translateX(0) to make them appear and slide into view.	CO3
7	Using HTML, CSS create display an image overlay effect on hover. a) Use the :before and :after pseudo-elements for the top and bottom bars of the overlayrespectively. Set their opacity, transform and transition to produce the desired effect. b) Use the <figcaption> for the text of the overlay. Set display: flex, flex-direction: columnand justify-content: center to center the text into the image. c) Use the :hover pseudo-selector to update the opacity and transform of all the elements anddisplay the overlay.	CO3
8	Using HTML, CSS create a bouncing loader animation. • Use @keyframes to define a bouncing animation, using the opacity and transform properties. Use a single axis translation on transform: translate3d() to achieve better animation performance. • Create a parent container, .bouncing-loader, for the bouncing circles. Use display: flex and justify-content: center to position them in the center. • Give the three bouncing circle elements the same width and height and border-radius: 50% to make them circular. • Apply the bouncing-loader animation to each of the three bouncing circles. • Use a different animation-delay for each circle and animation-direction: alternate to create the appropriate effect.	CO3
9	A sample html file with a submit button. Now modify the style of the paragraph text through javascript code.	CO5
10	Write a JavaScript function to get the values of First and Last names of the following form.	CO5

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	Course Outcomes	CL	Lab Sessions
1	**Apply** the basics fundaments for Web Foundations.	3	4
2	**Apply** the knowledge of formatting Tags for web developments in HTML	3	4
3	**Preparing** high level formatting by using Cascading style sheet.	3	4
4	**Apply** information exchange between computer systems such as websites, databases, and third-party applications.	3	4
5	**Validating** User's Input. JavaScript is very useful while using forms	5	4

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Program: B. Tech First Year Group-B(ME/EE/CE/AE/BT/ECE)

Semester-I | **Business Communication: BSH31X09**

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

Course Objective:

1	To understand the importance of knowledge of additional language.
2	To understand the importance of the language for daily routine.
3	To make students confident while communicating.
4	To understand the modes of communication.
5	To impart the knowledge for the personal details.

Course Contents

UnitI	**Introduction to communication:** Meaning & Definition of communication, Characteristics of communication, Objectives of communication, , social understanding, behaviors traits, teamwork.
UnitII	**Communication Skills:** Importance of communication, types, barriers of communication, effective communication, Listening Skills, behaviors traits, teamwork. Barriers to communication, Essentials of effective communication**.**
Unit III	**Media of communication and Channels of communication:** Oral media, Written media, Non-verbal media**,** Downward channels of communication, Upward channels of communication, Horizontal communication.
UnitIV	**Technical Writing:** Features of Technical Writing, Writing Scientific Projects, Technical Report writing, Writing Manuals, Writing Project Proposals, Writing Research papers.
UnitV	**Presentation Skills:** Importance of oral presentation, preparing and planning the presentation, organizing your presentation, checklist for making presentation. Leadership skills, decision making, negotiation skills.

Text Books

1	Effective technical Communication by Barun K. Mitra, Oxford University Press
2	Technical Communication-Principles and Practice by Meenakshi Raman & Sharma, Oxford University Press,2011, ISBN-13-978-0-19-806529-

ReferenceBooks

1	Meenakshi Raman "Technical Communication: Principles and practice, "Oxfored University press, India."
2	**Basic Business Communication Skills for Empowering the Internet Generation,**Lesikar, R.V. & Flatley, M.E. (2005). Tata McGraw Hill Publishing Company Ltd. New Delhi.

UsefulLinks

1	https://nptel.ac.in/courses/109104031
2	https://www.coursera.org/learn/business-english-skills-how-to-navigate-tone-formality-directness-in-emails
3	https://www.skillsyouneed.com/presentation-skills.html

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CO	Course Outcomes	CL	Class Session
CO 1	**Determine** the barriers of communication and overcome those	3	9
CO 2	**Justify** their messages through formal correspondence	3	9
CO 3	**Describe** their technical work	4	9
CO 4	**Show** the skills required for effective presentation	4	9
CO 5	**Assess** themselves and **solve** the problems	3	9

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Program: B. Tech First Year Group-B(ME/EE/CE/AE/BT/ECE)

Semester-I | **Differential Equation and Statistics:BSH31201**

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**	**CA**	10 Marks	-	-
Duration of ESE:2Hrs		**ESE**	60 Marks	-	-
		Total Marks	**100Marks**	-	-

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.

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.
Unit II	**Higher Order Differential Equation:** Higher order linear D.E. with constant coefficient, Methodof variations of Parameters, Cauchy's form, Legendre's Linear Equations. Application of second order differential equation to R-L-C CIRCUIT, Heat Equations.
Unit III	**Multivariable Calculus (Integration):** Double Integration (Cartesian and polar coordinates), Change of Order of Integration, Elementary Triple Integration, Application :Area by double integration and volume by triple integration.
Unit IV	**Probability:** Conditional Probability, Discrete Random Variable, Continuous Random Variable, Probability Distribution function, Probability density function, Binomial Distribution ,Uniform Distribution
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.

Text Books

1	Higher Engineering Mathematics by Bali Lyenger (LaxmiPrakashan) 9th Edition
2	Advance Engineering Mathematics by Ervin Kreysizing 9th Edition
3	GB Thomas and R.L. Finney, Calculus and Analytic geometry 9th edition, Pearson, Reprint2002.

Reference Books

1	"Higher Engineering Mathematics" by Erwin Kreyszing 9th edition
2	A textbook of Engineering Mathematics by N.P. Bali, Manish Goyal, Laxmi Publication, Reprint 2010
3	Higher Engineering Mathematics by B. S. Grewal ,Khanna Publisher 35th edition .

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Useful Links	
1	https://nptel.ac.in/courses/111/107/111107108/
2	https://nptel.ac.in/courses/111/105/111105121/
3	https://nptel.ac.in/courses/111/107/111107111/

CO	Course Outcomes Students will be able to-	CL	Class Session
CO1	**Apply** different methods to solve Linear differential equation	3	10
CO2	**Solve** problems by using Higher order differential equation.	3	10
CO3	**Determine** area, mass and volume by using concept ofintegration.	3	9
CO4	**Apply** the Probability concepts to real-world Phenomena.	3	10
CO5	**Use** of statistical method to solve the problem on fitting of straight line andParabola.	3	9

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Semester-II | **Solid state Physics & Optics: BSH31208**

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: 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 laser with their application in engineering and medical field.

Course Contents

Unit I	**Crystallography:** Introduction, Classification of Crystal structure, 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.
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.
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)
Unit IV	**Interference in thin film:** Introduction, thin film, Plane Parallel thin film, Wedge shaped thin film, Newton rings, Antireflection coating.
Unit V	**Laser:** Introduction of Laser and its characteristics, Interaction of radiation with matter, Metastable state, Active Medium, Condition of Light amplification, Population Inversion, pumping, Three and four level laser, Ruby laser, Properties and engineering applications

Text Books

T.1	A textbook of Engineering physics: Dr. M. N. Avadhanulu, Dr. P. G. Kshirsagar, 8th Revised Edition, S. Chand Publication,NewDelhi.
T.2	A textbook of Optics: N. Subrahmanyam, Brij Lal, M.N. Avadhanulu, 23rd Revised andEnlargedEdition2006,S. Chand Publication,NewDelhi.
T.3	Principles of Electronics :V. K. Mehta, Rohit Mehta, Multi colour Illustrate And Thoroughly Revised TenthEdition 2006,S. Chand Publication,NewDelhi.

Reference Books

R.1	Modern Physics: Theraja B.L., Reprint 2nd Edition, S. Chand & CO, New Delhi.
R.2	Solid State Physics: Dekker J., Reprint1stEdition,McMillan India Ltd, Mumbai.

Useful Links

1	https://nptel.ac.in/courses/115/102/115102124/

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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: BSH31209)		
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	DeterminetheripplefactorandrectificationefficiencybyHalfWaveandFull 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

TextBooks	
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 text book of Practical Physics: Samir Kumar Ghosh,1stEdition, New Central Book Agency, Kolkata.
ReferenceBooks	
R.1	Engineering Physics: Dattu Joshi, Tata McGraw Hill Education, New Delhi.
R.2	A textbook of Engineering physics: Dr. M. N. Avadhanulu, Dr. P. G. Kshirsagar, S. Chand Publication.
UsefulLinks	
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	10
CO3	**Explain** pn junction diode, Zener diode, Light emitting diode and transistor with their application in engineering field.	4	10
CO4	**Analyze** the concept of interference in parallel and wedge shaped thin film and their application in engineering field..	4	10
CO5	**Explain** the characteristics of laser and their application in engineering.	4	9

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Program: B. Tech First Year Group-B(ME/EE/CE/AE/BT/ECE)

Semester-I | **Principle of Electrical Engineering: BEE31202**

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 practical transformer, 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 Schematic Presentation 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

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/

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LIST OF EXPERIMENTS		
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

TextBooks	
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.
ReferenceBooks	
R.1	E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
R.2	D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.
UsefulLinks	
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	**Apply** Kirchhoff's current and voltage laws to analyze and solve complex DC electrical circuits.	4	9
CO 2	**Analyze** single-phase and three-phase AC circuits, calculate power parameters, and make informed decisions regarding their applications.	3	9
CO 3	**Evaluate** and optimizing transformers and magnetic circuits with a focus on factors such as material characteristics, losses, and connection configurations.	5	9
CO 4	**Analyze** 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.	3	9

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TulsiramjiGaikwad-PatilCollegeofEngineeringandTechnology
WardhaRoad,Nagpur-441108
NAACAccreditedwithA+Grade
(AnAutonomousInstituteAffiliatedtoRTM NagpurUniversity, Nagpur)

Program: B. Tech First Year Group-B(ME/EE/CE/AE/BT/ECE)

Semester-I | **Programming for Problem Solving using 'C': BIT31103**

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.	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	**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.
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, gotowith Example.
Unit III	**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.

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.

Useful Links

1	https://youtu.be/-wv-OERJK3M

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2	https://youtu.be/IdXrCPzNnkU
3	https://youtu.be/5AHRXOtn9bY

Sheet No.	List of Experiments(Programming for Problem Solving using 'C'Lab: BIT31104)	
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.	CO

CO	Course Outcomes	CL	Class Session
CO1	**Interpret** a problem and build an algorithm/flowchart to solve it	3	9
CO2	**Apply** the concept of subprograms and Loops for programming	3	9
CO3	**Examine** C programs using various control statements, arrays and algorithms.	4	9

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Program: B. Tech First Year Group-B(ME/EE/CE/AE/BT/ECE)

Semester-I | **Power SIM: BEE31204**

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

Pre-Requisites: NA

Course Objectives:

1.	Apply theoretical knowledge for practical use and solve engineering problems.
2.	Design basic circuits using Electrical Elements.
3.	Design and simulate simple Electrical and Electronics circuits.

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, Thevenin's Theorem and Norton's 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 practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Autotransformer and three-phase transformer connection
Unit IV	Formation of p-n junctions, position of Fermi level in equilibrium, V-I characteristics in forward and reverse bias, Capacitances in p-n junction diode, Zener diode, Zener diode as a voltage regulator.
Unit V	Structure of NPN and PNP Transistors, BJT Configurations, Operation of BJT Common Emitter, Common Base and Common Collector Configuration, V-I characteristics.

Text Books

T.1	Farzin Asadi and Kei Eguchi, "POWER ELECTRONICS CIRCUIT ANALYSIS WITH PSIM" Walter de Gruyter GmbH & Co KG, 2021

Reference Books

R.1	Stanislaw Szablowski,"Teaching Power Electronics: Simulation Studies using PSIM Software" LAP LAMBERT Academic Publishing (May 10, 2019)

Useful Links

1	https://www.poweresim.com/
2	https://powersim.com/downloads/
3	https://en.wikipedia.org/wiki/PSIM_Software
4	https://powersimtech.com/wp-content/uploads/2021/01/PSIM-User-Manual.pdf

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Sheet No.	List of Experiments/Drawing sheets	
1	Design and Simulate simple circuits to verify Kirchhoff's Law.	CO1
2	Design and Simulate circuits to verify network theorems such as Superposition theorems.	CO1
3	Measure the voltage, current, and power in the R-L, R-C, and R-L-C series circuits and observe the phase difference between voltage and current.	CO2
4	Design and Simulate circuit to transform AC to high volt DC using voltage multiplier.	CO2
5	Simulation of single-phase Transformer in PSIM.	CO3
6	Simulation of three-phase Transformer in PSIM.	CO3
7	Simulate Zener diode as a voltage regulator.	CO4
8	To observe the output voltage waveform of a half wave rectifier and center tapped full wave rectifier with and without capacitor filter.	CO4
9	To observe Input and Output Characteristics of BJT in CE configuration using PSIM simulator.	CO5
10	To observe Input and Output Characteristics of BJT in CB configuration using PSIM simulator.	CO5

CO	Course Outcomes	CL	Class Session
CO1	**Apply** Kirchhoff's current and voltage laws to analyze and solve complex DC electrical circuits	3	4
CO2	**Analyze** single-phase and three-phase AC circuits and calculate power parameters.	4	4
CO3	**Analyze** single-phase and three-phase transformers.	4	4
CO4	**Analyze** various diodes to understand basics of electronics.	4	4
CO5	**Analyze** the types of transistors.	4	4

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Program: B. Tech First Year Group-B(ME/EE/CE/AE/BT/ECE)

Semester-I | **CNC Machine and Programming:BME31201**

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

Pre-Requisites: NA

Course Objectives:

1.	Identify different metal removal processes.
2.	Explain application and advantage of CNC machines and technology.
3.	Demonstrate the controls of different CNC machines.
4.	Explain the construction and working principle of CNC system.
5.	Identify different axes, machine zero, home position of CNC turning machine.

Course Contents

UnitI	**Fundamentals of Machining process**-Introduction**,** Overview of metal removal processes,Lathe - Classification, components and accessories, Milling — Classification, components andaccessories, Machining center.
UnitII	**Introduction to CNC Technology** - History and development of NC technology, Conventional vs. CNC machine tools, Classification of CNC machines, Differentiate between NC CNC DNC
UnitIII	**Characteristics of modern CNC machine tools**-Controllable feed and rotation axis, Path measuring system**,**Tool change facilities**,** Safety precaution on CNC machine tool.
Unit IV	**Constructional details of CNC machines**-Machine structure, Spindle and spindle drive unit, Constructional details and working of ball screw and L.M.(Linear Motion) guide ways.**,** Working of Machine control unit., Working of hydraulic and pneumatic systems used for chuck, tool and palletChanging in CNC machines.
UnitV	**Basic geometry for CNC machining** - Types of coordinate system**,** Axis identification methods**,** Identification of zero and reference points on CNC machine tools, Types of motion control system, Tool compensation for CNC machining

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
	CAD/CAM Principles Applications, P. N. Rao, Tata McGraw Hill

Reference Books

R.1	CAD/CAM Computer Aided Design and manufacturing, Groover, Zimmers, Pearsons

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R.2	Computer Numerical Control-Turning And Machining Centers , Quesada Robert, Prentice Hill India, New Delhi
R.3	AdvanceManufacturingProcess, 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	Perform simple job on lathe including turning, facing, chamfering and drilling Operation.	**CO1**
2	Perform simple job on Machine including face Milling and Slotting operation.	**CO1**
3	Daw various components of CNC lathe machine	**CO2**
4	Draw various components of CNC milling machining centre	**CO2**
5	Demonstration of various safety symbols for the CNC machines	**CO3**
6	Demonstration of variouscontrols and feeds for the CNC machines	**CO3**
7	Demonstration of CNC machine referencing and manual Jog mode.	**CO4**
8	Demonstration of setting and presetting of tools on CNC machine	**CO4**
9	Demonstration of Programming input on CNC machine	**CO5**
10	Operate CNC machine and try to change different parameters and controls to observe their effects during machining	**CO5**

CO	Course Outcomes	CL	Class Session
CO1	**Demonstrate** different metal removal processes.	3	5
CO2	**Summarize** the application and advantage of CNC machines and technology.	3	6
CO3	**Demonstrate** the controls of different CNC machines.	3	7
CO4	**Demonstrate**the construction and working principle of CNC system.	3	7
CO5	**Demonstrat**e different axes, machine zero, home position of CNC turning machine.	3	5

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Program: B. Tech First Year Group-B(ME/EE/CE/AE/BT/ECE)

Semester-I | **Building Maintenance lab:BCE31201**

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
4	Select suitable types of fire services as per requirements of building
5	Apply Green Building technology aspects and provide Acoustic, Sound insulation as per needs

Course Contents

Unit I	Introduction to Building Services Definitions, Objective and uses of services, Applications of services for different types building considering, Classification of building services, Types of services and selection of services. Water supply system - Wastewater system, Pipe sizing – scheme of water supplyand waste water, Venting – Plumbing system, Inspection and tests
Unit II	Natural and artificial lighting - principles and factors, Arrangement of luminaries,Distribution of illumination, Utilization factors, Ventilation - Necessity of Ventilation, Types – Natural and Mechanical, Factors to beconsidered in the design of Ventilation
Unit III	Electrical Services and Layout Electrical services in the building: Technical terms and symbols for electrical installationsand Accessories of wiring, Types of insulation
Unit IV	Fire Protection Introduction, causes & types of fire, Effects of fire, need of fire safety & preventive measures, General Requirements of Fire Resisting building as per IS and NBC 2005, Characteristics of Fire resisting materials, Maximum Travel Distance, Fire Fighting Installations for Horizontal Exit, Roof Exit / Fire Lifts, External Stairs. Study of Fire detection systems such as smoke detectors, heat detectors, fire alarms etc. Water demand forfire-fighting, provision for storage tanks. Types of Fire extinguishing systems.
Unit V	Acoustic and Sound Insulations Requirement of good Acoustic, various sound absorbents, Factors to be followed for noisecontrol in residential building Green Buildings Provisions Rain water Harvesting for buildings, Concept of GREEN buildings, Components of GREEN building. Introduction and Significance of Grey water treatment, Components &management of Greywater system

Text Books

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

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Reference Books	
1	National Building Code of India – 2005, Bureau of Indian Standards (BIS) New Delhi
2	Building Repair & Maintenance Management, P. S. Gahlot, CBS Publishers & Distribution (P) Ltd
3	Green Building: Guidebook for Sustainable Architecture, Michael Bauer, Springer (2010 edition)
Useful Links	
1	www.nptel.iitm.ac.in
2	www.bis.org.in/sf/nbc.htm

Sheet 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 (Students will be able to)	CL	Lab Sessions
CO 1	**Categorize** building services and explain the criteria for selecting the appropriate type of service for a particular building	4	12
CO 2	**Deduce** the principles of natural and artificial lighting, ventilation along with the factors affecting them	4	10
CO 3	**Distinguish** the technical terms and symbols used in electrical services & installations	4	8
CO 4	**Apply** fire safety principles to the design and construction of buildings	3	14
CO 5	**Implement** latest developments in acoustics, rainwater harvesting, and green building technology	3	16

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Program: B. Tech First Year Group-B(ME/EE/CE/AE/BT/ECE)

Semester-I | **Basics of Aircraft Design: BAE31201**

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

Pre-Requisites: NA

Course Objectives:

1.	Introduce students to the fundamental principles of aircraft component drawing.
2.	Develop students proficiency in producing 2D and 3D representations of aircraft components.
3.	Familiarization with GD&T principles and symbols commonly used in aeronautical engineering.
4.	Stress the importance of proper fit, alignment and clarity in aerospace assemblies.
5.	Educate students about the criteria and properties involved in selecting aerospace materials and manufacturing processes specific to aeronautical engineering.

Course Contents

UnitI	**Introduction to Aircraft Component Drawing:** Introduction to the course, its significance, and the aerospace industry, Overview of aerospace materials, manufacturing processes, and regulations, Introduction to aircraft component drawing standards and conventions.
UnitII	**Technical Drawing Techniques:** Basics of technical drawing: line types, scales, and projection methods, Creating 2D drawings of aircraft components, Representing 3D components in 2D drawings.
UnitIII	**Geometric Dimensions and Tolerances (GD&T):** Introduction to GD&T principles and symbols used in aerospace engineering, Applying GD&T in aircraft component drawings, Communicating precise tolerances and geometric features.
Unit IV	**Assembly Drawings and Sub assemblies:**Creating assembly drawings for aircraft components, Representing sub assemblies and component relationships, Emphasizing fit, alignment, and clear representation in aerospace assemblies.
UnitV	**Materials, Manufacturing, and Compliance:** Aerospace materials selection criteria and properties, Manufacturing processes relevant to aerospace engineering, Regulatory compliance in aircraft component drawing.

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Sheet 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

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.
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

CO	Course Outcomes	CL	Class Session
CO1	**Implement** the use of various devices & **illustrate** the soldering-de-soldering process of elements on PCBs	3	4
CO2	**Utilize** the concepts of auxiliary winding & two-way switch in electrical engineering applications	3	4
CO3	**Differentiate** the domestic wiring methods & its procedures practically	4	4
CO4	**Analyze** the half wave rectifier, full wave rectifier & inverter circuit	4	4
CO5	**Use** the fundamental concepts of protective devices used in electrical Engineering applications.	3	4

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Program: B. Tech First Year Group-B(ME/EE/CE/AE/BT/ECE)

Semester-I | **Environmental Biotechnology Lab: BBT31201**

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

Pre-Requisites:

Course Objective:

1	To acquire knowledge about ecosystems, biogeochemical cycles and environmental issues
2	To explore waste management, bioremediation, and microbial applications
3	To demonstrate biocontrol and biofertilizers, and their impact on agriculture
4	To examine microbial roles in mining, sewage treatment, and environmental conservation
5	To comprehend skills in environmental assessment and sustainable biotechnological solutions

Course Contents

Unit I	**Waste water analysis:** Ecosystems-Brief overview of structure and function of an ecosystem. Biogeochemical cycles: Carbon cycle, nitrogen cycle and water cycle. Environment: Basic concepts, types of pollution: Air, water and soil pollutions, causes, sources and impacts. Global environmental problems: Green house effect, global warming, ozone depletion, photochemical smog and acid rain.
Unit II	**Solid waste management:** An overview of classification of waste, solid waste management Incineration, pyrolysis, landfilling, composting and its types. Basic concepts of bioremediation o soil and water. Brief overview of phyto-remediation and its types. Microbial degradation o pesticides and xenobiotic compounds, metabolism and mechanism of degradation, degradative plasmids, microbes and cloning strategies
Unit III	**Isolation and production and analysis of bio-fertilizer producing microorganism:** Bioinsecticides: *Bacillus thuringiensis*, baculoviruses, genetic modifications and aspects of safety in their use. Biofungicides: Mode of actions and mechanism (*Trichoderma*). Biofertilizers: Algal fertilizers, nitrogen fixing bacteria, phosphate solubilising microbes, VAM, plant growth promoting rhizobacteria (PGPR). Earthworm as biofertilizer. An overview of soil biotechnology.
Unit IV	**Hardness and alkalinity of water:** Environment: Basic concepts, types of pollution: Air, water and soil pollutions, causes, sources and impacts. Global environmental problems: Green house effect, global warming, ozone depletion, photochemical smog and acid rain
Unit V	**Fermentative production and determination of alcohol and testing of water quality:** Bioindicators and biosensors for detection of environmental pollution, Biofuels: Biogas, bioethanol, biodiesel, biohydrogen. A brief introduction of bioplastics and biosurfactants. Biotechnology in biodiversity conservation

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List of Experiments		
1	To estimate Dissolved oxygen in water sample	CO1
2	To quantify the COD and BOD of water body	CO1
3	To determine free CO2 content in the water sample	CO2
4	To determine the chloride content of the water sample	CO2
5	To isolate biofertilizer microbes by biological enrichment method	CO3
6	To demonstrate the production of microbial biofertilizers	CO3
7	To determine total hardness of water	CO4
8	To determine total alkalinity of water	CO4
9	To test the potable water for microbiological quality (coliform test)	CO5
10	To produce Alcohol by fermentation with use of Baker's yeast and it's Alcohol By Volume (ABV) quantification by dichromate method	CO5
Text Books		
1	Environmental Biotechnology. K. Allen 2016, CBS Publishers.	
2	Environmental Biotechnology: Theory and Applications. GM Evans & JC Furlong, 2003, Wiley Publishers.	
3	A Textbook of Practical Zoology. S.S. Lal Vol-III (2nd ed.). 2016. Rastogi Publication	
ReferenceBooks		
1	An advanced Laboratory Manual of Zoology. PT Mukhopadhyay and SK Das 2003 Macmillan India Limited	
2	Environmental and Pollution Science. I Pepper, CP Gerba, ML Brusseau, 2006 2nd Edition.	
3	Environmental Science: A Practical Manual. G. S Lakshmi	
UsefulLinks		
1	https://onlinecourses.nptel.ac.in/noc21_bt41/preview	
2	https://vlab.amrita.edu/?sub=3&brch=272&sim=1414&cnt=1	
3	https://vlab.amrita.edu/?sub=3&brch=272&sim=1430&cnt=1	

CO	CourseOutcomes	CL	Class Session
CO1	**Acquire** knowledge about ecosystems, biogeochemical cycles and environmental issues	3	9
CO2	**Explore** waste management, bioremediation, and microbial applications	3	9
CO3	**Demonstrate** biocontrol and biofertilizers, and their impact on agriculture	4	9
CO4	**Examine** microbial roles in mining, sewage treatment, and environmental conservation	4	9
CO5	**Comprehend** skills in environmental assessment and sustainable biotechnological solutions	3	9

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NAAC Accredited with A+ Grade
(An Autonomous Institute Affiliated to RTM Nagpur University, Nagpur)

Program: B. Tech First Year Group-B(ME/EE/CE/AE/BT/ECE)

Semester-I | **Communicationfor Personality Development Lab:BSH31X04**

Teaching Scheme		Examination Scheme (Th)		Examination Scheme(P)	
Theory (Th)	-	**CT-I**	-	-	-
Practical (P)	4Hrs/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	Understand the concept, process and importance of communication
2	Gain knowledge of media of communication
3	Develop skills of effective communication both written and oral
4	Pursuing the audience
5	Growing brand awareness

Course Contents

UnitI	**Introduction to Communication –** Definition of Communication**,** Process of Communication**,** Importance of Communication, Essentials of Good communication.
UnitII	**Different forms of communication -** Verbal communication**,** Non-Verbal communication**,** Written communication**,** Barriers to Communication.
Unit III	**Development of English Language skills -** Listening skills& it's types**,** Speaking skills it's elements**,** Reading skills& it's types**,** Writing skills
UnitIV	**Development of Personality:-** The concept of Personality, Body Language, Dimensions of Personality, Building Confidence, Presentational Skills, Group Discussion, Interview Techniques
UnitV	**Attitude and Motivation -** Concept of Attitude**,** Types of Attitude**,** Concept of Motivation**,** Importance of Self-motivation

Text Books

1	PublicSpeakingandInfluencingMen inBusinessbyDaleCarnegie
2	TechnicalCommunicationbyMeenakshiRamanand SangeetaSharma,OUP
3	Communication Skills by Dr.P.Prasad
4	Communication Skills by Sanjay Kumarand Pushpalata, OUP

Reference Books

1	Personality Development And Soft Skills by Barun K. Mitra
2	**The Magic of Thinking Big by** David J. Schwartz

Useful Links

1	https://nptel.ac.in/courses/108/104/108104139/
2	http://nptel.ac.in/courses/117107095

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List of Experiment		CO
1	Introduction to Communication: Process & Techniques	**CO1**
2	Demonstrate 7C'S of Communication.	**CO1**
3	Explain Verbal &Non-verbal Communication	**CO2**
4	Description of Barriers to Communication: Methods to Overcome Barriers.	**CO2**
5	Acquire knowledge of Listening and Speaking skills.	**CO3**
6	Acquisition of Reading & Writing Skills.	**CO3**
7	Execute the Skills of Body Language.	**CO4**
8	Learning the Presentational Skills and Interview Technique.	**CO4**
9	Discuss concept of Self-motivation and it's importance.	**CO5**
10	Development of Positive Attitude.	**CO5**

CO	Course Outcomes	CL	Lab Sessions
CO1	**Learn** the importance and process of Communication.	4	4
CO2	**Apply** the skills of Verbal and Non-verbal communication and how to Overcome the barriers.	4	4
CO3	**Execute** the skills of Learning, Speaking, Reading and Writing to communicate effectively with engineering community and society.	5	5
CO4	**Demonstrate** the skills for effective presentation and effective body language.	5	4
CO5	**Acquire** the knowledge of positive attitude and self-motivation.	5	4

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Program: B. Tech First Year Group-B(ME/EE/CE/AE/BT/ECE)

Semester-I | **Integrated Personality Development Course-I:BSH31X05**

Teaching Scheme		Examination Scheme (Th)		Examination Scheme(P)	
Theory (Th)	-	**CT-I**	-	-	-
Practical (P)	4Hrs/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.	Provide a holistic value - based education.
2.	Making more marketable when entering the workforce
3.	Promote personal growth and improve well being, stability and productivity.

Course Contents

Unit I	Remaking Yourself , Begin with the End in Mind, Being Addiction free, Stress Management, Better Health, Better Future, Impact of Company.
Unit II	Lessons of Seva, Selfless Service, Case Study:Bhuj earthquake: relief work.
Unit III	Soft Skills, Team work, Harmony,Financial Planning.
Unit IV	My India My Pride, Present Scenario, An ideal Citizen-1, An ideal Citizen-2, Learning from Legends, Leading attitude, Words of Wisdom.
Unit V	Facing Failures, Timeless Wisdom for Daily Life, From House to Home, Forgive &Forget.

Text Books

T.1	Awaken the Giant Within by Tony Robbins..

Reference Books

R.1	How to Win Friends and Influence People Author: Dale Carnegie Publish Year: 1936

Useful Links

1	https://nptel.ac.in/courses/109104107
2	https://onlinecourses.nptel.ac.in/noc21_hs02/preview
3	https://onlinecourses.nptel.ac.in/noc22_hs77/preview
4	https://archive.nptel.ac.in/noc/courses/noc20/SEM2/noc20-hs43/

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Sheet No.	List of Experiments/Drawing sheets	
1	SWOT Analysis and it's application in marketing challenges.	CO1
2	SWOC Analysis for a company's success and growth	CO1
3	Family Budget Info graphic .	CO2
4	Describe the Pie Chart showing the percentage of a family's household income distributed into different categories	CO2
5	Design a bar graph representing Do's and Dont's of human values during selfless service.	CO3
6	Design a tool for measuring your Emotional, Intelligent Quotient.	CO3
7	Geometric Art : Using geometric shapes / patterns measure your academic growth by assessing the accuracy of angles, symmetry and precision in your art..	CO4
8	Assess your inspirational growth through historical diorama of any one Legend of India, you consider as your role model.	CO4
9	Evaluate overall growth by designing a book cover and by analyzing how well the cover captures the essence of the story.Draft a story using a fictional character	CO5
10	Showcase your own style or method of work intending your versatility through portfolio	CO5

CO	Course Outcomes	CL	Class Session
CO1	**Apply** soft skills that complement hard skills.	3	4
CO2	**Analyze** self and prepare for the modern challenges	4	4
CO3	**Promoting** fortitude in the face of failures, unity amongst family discord, self- discipline amidst distractions, and many more priceless lessons.	5	4
CO4	**Analyze** morality and character development.	4	4
CO5	**Analyze** the core of student growth, to enable students to become self-aware, sincere, and successful in their many roles as an ambitious student.	4	4

				Aug, 2024	2.00	Applicable forAY 2023-24 Onwards
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