

NOIDA INSTITUTE OF ENGG. & TECHNOLOGY, GREATER NOIDA, GAUTAM BUDDH NAGAR
(AN AUTONOMOUS INSTITUTE)



Affiliated to

DR. A.P.J. ABDUL KALAM TECHNICAL UNIVERSITY, LUCKNOW



Evaluation Scheme & Syllabus

For

Bachelor of Technology

Biotechnology

First Year

(Effective from the Session: 2026-27)

NOIDA INSTITUTE OF ENGINEERING & TECHNOLOGY, GREATER NOIDA, GAUTAM BUDDH NAGAR

(AN AUTONOMOUS INSTITUTE)

Bachelor of Technology

Biotechnology

Evaluation Scheme

SEMESTER-I

Sl. No.	Subject code	Subject Name	Types of Subjects	Periods			Evaluation Schemes				End Semester		Total	Credit
				L	T	P	CT	TA	TOTAL	PS	TE	PE		
1	DBT0101/ DBT0103	Elementary Mathematics / Remedial Biology	Mandatory	3	1	0	30	20	50		100		150	4
2	DAS0101B	Engineering Physics	Mandatory	3	0	0	30	20	50		100		150	3
3	DCSAI0101	Fundamentals of Artificial Intelligence	Mandatory	2	0	0	30	20	50		50		100	2
4	DAS0151B	Engineering Physics Lab	Mandatory	0	0	2				25		25	50	1
5	DCSE0151	C Programming	Mandatory	0	0	4				50		50	100	2
6	DME0151	CAD and Digital Manufacturing Lab	Mandatory	0	0	2				25		25	50	1
7	DBT0152	Good Manufacturing and Laboratory Practices	Mandatory	0	0	2				25		25	50	1
8	DASL0151	Acquiring Business Communication (ABC) Lab	Mandatory	0	0	4				50		50	100	2
9	DASCC0101	Design Thinking-I	Mandatory	2	0	0	60	40	100				100	2
10	DNC0103/ DNC0102	Essence of Indian Traditional Knowledge / Constitution of India, Law and Engineering	Compulsory Audit	2	0	0	30	20	50				50	NA
		*Massive Open Online Courses (For B.Tech. Hons. Degree)	*MOOCs											
		TOTAL		13	1	14			250	175	250	175	850	18

*List of MOOCs Based Recommended Courses for First Year (Semester-I)					
S. No.	Subject Code	Course Name	University / Industry Partner Name	No of Hours	Credits
1	DMC0012	Programming in C	Infosys Wingspan (Infosys Springboard)	17h 7m	1
2	DMC0021	Microsoft Excel 2016	IIHT	10hr 7 min	0.5

PLEASE NOTE: -

- **A 3-4 weeks Internship shall be conducted during summer break after semester-II and will be assessed during semester-III**
- **Compulsory Audit (CA) Courses (Non-Credit - DNC0103/DNC0102)**
 - All Compulsory Audit Courses (a qualifying exam) do not require any credit.
 - The total and obtained marks are not added in the grand total.

Abbreviation Used:

L: Lecture, T: Tutorial, P: Practical, CT: Class Test, TA: Teacher Assessment, PS: Practical Sessional, TE: Theory End Semester Exam.,
 CE: Core Elective, OE: Open Elective, DE: Departmental Elective, PE: Practical End Semester Exam, CA: Compulsory Audit,
 MOOCs: Massive Open Online Courses.

NOIDA INSTITUTE OF ENGINEERING & TECHNOLOGY, GREATER NOIDA, GAUTAM BUDDH NAGAR

(AN AUTONOMOUS INSTITUTE)

Bachelor of Technology

Biotechnology

Evaluation Scheme

SEMESTER-II

Sl. No.	Subject code	Subject Name	Types of Subjects	Periods			Evaluation Schemes				End Semester		Total	Credit
				L	T	P	CT	TA	TOTAL	PS	TE	PE		
1	DAS0201	Biostatistics	Mandatory	3	1	0	30	20	50		100		150	4
2	DCSIOT0202	IoT in Life Sciences	Mandatory	3	0	0	30	20	50		100		150	3
3	DCSE0204	Data analytics	Mandatory	3	0	0	30	20	50		100		150	3
4	DBT0201	Fundamentals of Bioengineering	Mandatory	2	0	0	30	20	50		50		100	2
5		Foreign Language	Core Elective	2	0	0	60	40	100				100	2
6	DCSIOT0252	IoT in Life Sciences Lab	Mandatory	0	0	2				25		25	50	1
7	DCSE0254	Data analytics Lab	Mandatory	0	0	4				50		50	100	2
8	DCSE0252	Problem Solving using Python	Mandatory	0	0	6				50		100	150	3
9	DASL0251	Communication for Career Enhancement	Mandatory	0	0	4				50		50	100	2
10	DMB0201	Innovation and Entrepreneurship	Mandatory	2	0	0	60	40	100				100	2
11	DNC0202/ DNC0203	Constitution of India, Law and Engineering/ Essence of Indian Traditional Knowledge	Compulsory Audit	2	0	0	30	20	50				50	NA
		*Massive Open Online Courses (For B.Tech. Hons. Degree)	*MOOCs											
		TOTAL		16	1	16			400	175	350	225	1150	24

Foreign Language:

S. No.	Subject Code	Course Name	Types of Subjects
1.	DASL0202	French	Core Elective
2.	DASL0203	German	Core Elective
3.	DASL0204	Japanese	Core Elective

*List of MOOCs Based Recommended Courses for First Year (Semester-II)

S. No.	Subject Code	Course Name	University / Industry Partner Name	No of Hours	Credits
1	DMC0002	Programming Fundamentals using Python	Infosys Wingspan (Infosys Springboard)	66h 10m	4
2	DMC0022	AI Artificial Intelligence with Python	Infosys Wingspan (Infosys Springboard)	7 h 21 min	0.5

PLEASE NOTE: -

- **Compulsory Audit (CA) Courses (Non-Credit - DNC0202/DNC0203)**
 - All Compulsory Audit Courses (a qualifying exam) do not require any credit.
 - The total and obtained marks are not added in the grand total.

Abbreviation Used:

L: Lecture, T: Tutorial, P: Practical, CT: Class Test, TA: Teacher Assessment, PS: Practical Sessional, TE: Theory End Semester Exam.,
CE: Core Elective, OE: Open Elective, DE: Departmental Elective, PE: Practical End Semester Exam, CA: Compulsory Audit,
MOOCs: Massive Open Online Courses.

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A student will be eligible to get Under Graduate degree with Honours only, if he/she completes the additional MOOCs courses such as Coursera certifications, or any other online courses recommended by the Institute (Equivalent to 20 credits). During Complete B.Tech. Program Guidelines for credit calculations are as follows.

1. For 6 to 12 Hours =0.5 Credit
2. For 13 to 18 =1 Credit
3. For 19 to 24 =1.5 Credit
4. For 25 to 30 =2 Credit
5. For 31 to 35 =2.5 Credit
6. For 36 to 41 =3 Credit
7. For 42 to 47 =3.5 Credit
8. For 48 and above =4 Credit

For registration to MOOCs Courses, the students shall follow Coursera registration details as per the assigned login and password by the Institute these courses may be cleared during the B. Tech degree program (as per the list provided). After successful completion of these MOOCs courses, the students shall provide their successful completion status/certificates to the Controller of Examination (COE) of the Institute through their coordinators/Mentors only.

The students shall be awarded Honours Degree as per following criterion.

- i. If he / she secures 7.50 as above CGPA.
- ii. Passed each subject of that degree program in the single attempt without any grace.
- iii. Successful completion of MOOCs based 20 credits



Course Code: DBT0101				Course Name: Elementary Mathematics							L	T	P	C
Course Offered in: B.Tech- First Semester BT											3	1	0	4
Pre-requisite: Knowledge of Mathematics up to 12 th standard														
Course Objectives: The objective of this course is to familiarize the graduate engineers of Biotechnology with techniques in basic algebra, differential calculus, integration and solving Ordinary Differential Equations of first order. It aims to equip the students with standard concepts and tools from basic to intermediate level that will enable them to tackle more advanced level of mathematics and applications that they would find useful in their disciplines.														
Course Outcome: After completion of the course, the student will be able to												Bloom's Knowledge Level (KL)		
CO1	Apply concept of equation to solve quadratic equations and system of linear inequality in two variables.											K3		
CO2	Apply the concept of differentiation to find the derivative of different type functions, rate of change and maxima and minima.											K3		
CO3	Apply concept of integration to evaluate integrals and definite integrals.											K3		
CO4	Apply the concept of differentiation and integration to find the solution of differential equations.											K3		
CO5	Apply the concept of matrix and determinants to find the solution of system of linear equation.											K3		
CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)														
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	
CO1	3	3	3	1	1	-	-	-	-	1	1			
CO2	3	3	3	1	1	-	-	-	-	-	1			
CO3	3	3	3	1	1	-	-	-	-	-	1			
CO4	3	3	3	1	1	-	-	-	-	1	1			
CO5	3	3	3	1	1	-	-	-	-	-	1			
Course Contents / Syllabus														
Unit 1			Algebra									09 hours		
Statement of Fundamental Theorem of Algebra, solution of quadratic equations in the complex number system. Linear inequalities. Algebraic solutions of linear inequalities in one variable and their representation on the number line. Graphical solution of linear inequalities in two variables. Solution of system of linear inequalities in two variables graphically.														
Unit 2			Differential Calculus									09 hours		
Functions, Limit, Continuity and Differentiability. Definition of derivative, physical and geometrical significance of derivative, derivative by first principal. Derivative of sum, difference, product and quotient of functions. Derivatives of polynomial and trigonometric functions,														

derivative of composite functions, chain rule, derivatives of inverse trigonometric functions, derivative of implicit function. Concept of exponential and logarithmic functions and their derivative. Logarithmic differentiation. Derivative of functions expressed in parametric forms. Second order derivatives. Applications of Derivatives: rate of change, maxima and minima (second derivative test only). Simple problems (that illustrate basic principles and understanding of the subject as well as real life situations).

Unit 3	Integral Calculus	09 hours
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Integration as inverse process of differentiation. Integration of a variety of functions by substitution, by partial fractions and by parts, only simple integrals of the type to be evaluated. Basic properties of definite integrals and evaluation of definite integrals. Applications of the Integrals: Applications in finding the area under simple curves, especially lines, areas of circles/parabolas/ellipses (in standard form only).

Unit 4	Differential Equations	09 hours
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Definition, order and degree, general and particular solutions of a differential equation. Formation of differential equation whose general solution is given. Solution of differential equations of first order and first degree by method of separation of variables, homogeneous differential equations. Solutions of linear differential equation of the type: $\frac{dy}{dx} + py = q$, where p and q are functions of x.

Unit 5	Matrices and Determinants	09 hours
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MATRICES: Definition, Types of Matrices, Addition, Subtraction, Scalar Multiplication and Multiplication of Matrices, Determinants: Definition, Minors, Cofactors, Properties of Determinants. Adjoint, Inverse and solution of system of linear equations.

Total Lecture Hours		45 hours
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Textbook:

S.No	Book Title	Author
1	Mathematics - Textbook for Class XI, NCERT Publication	NCERT
2	Mathematics Part I - Textbook for Class XII, NCERT Publication	NCERT
3	Mathematics Part II - Textbook for Class XII, NCERT Publication	NCERT

Reference Books:

S.No	Book Title	Author
1	Higher engineering mathematics (Tata Macgraw Hill)	B.V.Ramana
2	Advanced modern engineering mathematics (pearson education)	Glyn james

Self-Study Content Links:

Self-Study Content Links:		Duration (in Hrs)
MOOCs	https://www.coursera.org/learn/basic-mathematics-engineering#modules	18 Hrs
Video Lectures	Unit 1	
	https://youtu.be/cAfRgqEOURw	11:06
	https://youtu.be/s8XM3WFgLc	22:19
	https://youtu.be/8kUdS6eeYf4	15:23
	https://youtu.be/05_xs3F6BHQ	20:42
	https://youtu.be/AAMT_sYvQ4	12:52
	https://youtu.be/FWbcKade3rw	10:56
	https://youtu.be/CA4S7S-3Lg4	05:35

	Unit 2 https://youtu.be/kvGsIo1TmsM https://youtu.be/kdEQGfeC0SE?list=PLbjngCJMSuvpdE8YFIxRWVDVNCMCrX2AL https://youtu.be/JrYmEo6hoiU https://youtu.be/N2PpRnFqnqY https://youtu.be/xuAiQOzIkWY https://youtu.be/1TK8V_qmqrk?list=PLSQL0a2vh4HBZCG7kSoYbhsO_aFGasc3m https://youtu.be/HvrHNR26irM https://youtu.be/-CTaxKTzbEI?list=PLSQL0a2vh4HBY0-BZOePhgg46abJ9iVYS https://youtu.be/-CTaxKTzbEI?list=PLSQL0a2vh4HBY0-BZOePhgg46abJ9iVYS https://youtu.be/ho87DN9wO70 https://youtu.be/WqzY3xibFL8 https://youtu.be/LfAB3HDrZ_Y https://youtu.be/PEqCa0U77mc https://youtu.be/0T0QrHO56qg?list=PLSQL0a2vh4HC- https://youtu.be/mSVrqKZDRF4 https://youtu.be/yg_497u6JnA https://youtu.be/kf2dZWqLNgE https://youtu.be/s7rd9YPJrNc https://youtu.be/WC5VYKI807Q https://youtu.be/kQF9pOqmS0U Unit 3 https://youtu.be/B_sjlGWR2oE https://youtu.be/b76wePnIBdU https://youtu.be/bZ8YAHDTFJ8 https://youtu.be/sWSLLO3DS1I https://youtu.be/Mt92Ozs7aJg https://youtu.be/zOxaUIRkFG0 https://youtu.be/Gc3QvUB0PkI https://youtu.be/UjTTx2eYrx8 Unit 4 https://youtu.be/6o7b9yyhH7k https://youtu.be/BwghiuIfdPs https://youtu.be/6j8qQeOWu6k https://youtu.be/Dmd_6Kjq3w0 https://youtu.be/ZEJVyybsiT4 https://youtu.be/jxUYg2eh7zk https://youtu.be/p3YT0IipaJY Unit 5 https://youtu.be/0oGJTQCy4cQ?list=PLi5giWKc4eO1G8oX3ft8ZuLQr4Y4idgng	07:56 11:13 10:05 07:15 09:37 07:34 05:28 05:54 06:38 05:14 03:52 25:52 05:26 05:06 08:01 12:02 10:47 10:50 02:26 07:42 03:20 05:10 03:51 32:51 07:19 14:12 11:04 34:23 07:49 04:53 06:36 10:17 26:54 12:38 33:18 04:28
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	https://youtu.be/WR9qCSXJlyY?list=PLi5giWKc4eO1G8oX3ft8ZuLQr4Y4idgng https://youtu.be/TbaltFbJ3wE?list=PLi5giWKc4eO1G8oX3ft8ZuLQr4Y4idgng https://youtu.be/OMA2Mwo0aZg?list=PLi5giWKc4eO1G8oX3ft8ZuLQr4Y4idgng https://youtu.be/Ip3X9LOh2dk https://youtu.be/lhgFVZOgleg https://youtu.be/TZrKrNVhbjI https://youtu.be/oHzpMgKuI9Q https://youtu.be/01c12NaUQDw?list=PLSQL0a2vh4HBVbBiN69qZXuiK-y9yS3zv https://youtu.be/AUqeb9Z3y3k?list=PLSQL0a2vh4HBVbBiN69qZXuiK-y9yS3zv https://youtu.be/a2z7sZ4MSqo	05:34 02:17 05:29 10:02 05:02 03:41 03:25 02:47 16:32 04:15
Web References		



Course Code: DBT0103					Course Name: Remedial Biology							L	T	P	C
Course Offered in: B.Tech- First Semester BT												3	1	0	4
Pre-requisite: Basic knowledge of high school-level science (especially chemistry and biology).															
Course Objectives: To introduce students’ basic knowledge about structure and function of biomolecules. develop understanding about cell biology, and nucleic acids and understand the morphology and anatomy of plants															
Course Outcome: After completion of the course, the student will be able to												Bloom’s Knowledge Level (KL)			
CO1	To understand the basics of living systems											K1, K2			
CO2	To understand key common features of living organisms & its classification											K1, K2			
CO3	To know the anatomy and functions of plants											K1, K2			
CO4	To know the concepts of alleles and genes											K1, K2			
CO5	To understand the plant physiology											K1.K2			
CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)															
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	
CO1	3	2	2	2	2	3	3	1	1	1	2	2	3	2	
CO2	3	3	2	2	2	3	2	1	2	1	2	2	3	3	
CO3	3	3	3	3	2	2	2	1	2	1	2	3	3	3	
CO4	3	3	3	3	2	2	1	2	2	1	2	3	3	3	
CO5	3	3	3	2	2	3	3	3	3	1	2	3	3	3	
Course Contents / Syllabus															
Unit 1			Cell Biology											09 hours	
The cell concept, structure of prokaryotic, eukaryotic cells, plant cells and animal cells, Structure and function of cell membrane, cell organelles and their function. Structure and use of compound microscope, Macro and micro molecules, Basic chemical constituents of living body. Carbohydrates Classification of carbohydrates, functions of carbohydrates, Lipids-Classification and functions of lipids, Proteins Structure and functions of proteins, Enzymes- Chemical nature, classification and properties of enzymes, mechanism of enzyme activity.															
Unit 2			Classification of living organisms											09 hours	
Classification of living organisms (Five kingdom classification, major groups and principles of classification in each kingdom), Salient features of kingdom Monera, Protista and Fungi. Importance of microbiology, Importance of microorganisms in various fields, Classification and features of microorganisms. Systematic and binomial system of nomenclature, Concept of animal and plant classification.															
Unit 3			Morphology and anatomy of plants											09 hours	
Tissues in animal and plants, Morphology, anatomy and functions of different parts of plants: Root, stem, leaf, inflorescence, flower, fruit and seed, Concepts of botanical garden, herbaria, zoological park and museums.															
Unit 4			Cell division and Genetics											09 hours	
Concepts of alleles and genes, Mendelian Experiments, Cell cycle (Elementary Idea), mitosis and meiosis, techniques to study mitosis and meiosis.															

Unit 5	Plant Physiology	09 hours
Plant Physiology: Concepts of diffusion, osmosis, imbibition, Movement of water, food, nutrients and gases, Photosynthesis, plant growth and development.		
Total Lecture Hours		45 hours
Textbook:		
S.No	Book Title	Author
1	Biology-Textbook of Class XI, NCERT Publication	NCERT Publication
2	Biology-Textbook of Class XII, NCERT Publication	NCERT Publication
3	Together With Biology Study Material for Class 12	
Reference Books:		
S.No	Book Title	Author
1	Biology 12th Edition, Mc Grail Publications	Raven, George Johnson, Kenneth Mason, Jonathan Losos & Tod Duncan
2	TEXTBOOK OF BIOTECHNOLOGY, McGraw Hill	PATNAIK
3	Basic Biotechnology 3rd Edition, Cambridge University Press	Colin Ratledge & Bjorn Kristiansen

Self-Study Content Links:		Duration (in Hrs)
MOOCs	1 Cell Biology: Cellular Organization, Division and Processes (SWAYAM–PTEL)	24 hrs
	2. Microbiology (NPTEL)	20 hrs
	3. Plant Biotechnology (NPTEL)	24 hrs
	4. Cell Biology: Cellular Organization, Division and Processes (SWAYAM–NPTEL)	24 hrs
	5. Introduction to Plant Biology (NCERT SWAYAM)	40 hrs
Video Lectures	https://www.youtube.com/watch?v=_WM2hJmjctI https://www.youtube.com/watch?v=ZyWYID2cTK0&t=2s https://www.youtube.com/watch?v=URUJD5NEXC8&t=28s https://www.youtube.com/watch?v=qlOOGk7ryxc https://www.youtube.com/watch?v=b8MfRHfV4Q4 biology https://www.youtube.com/watch?v=w6yyWyzwqhg https://www.youtube.com/watch?v=EJEd3WhE5- https://www.youtube.com/watch?v=WVaRdAGV11M&t=1111s	2 hr 26 min
Web References	Khan Academy – Biology https://www.khanacademy.org/science/biology Cell biology, genetics, microbiology, plant physiology2	8–10 hrs
	MIT Open Course Ware – Introductory Biology https://ocw.mit.edu/courses/7-012-introduction-to-biology-fall-2004/ Cell biology, genetics, molecular biology Open Stax Biology2e	30–35 hrs
	https://openstax.org/details/books/biology-2e Complete biology textbook (self-paced)	40–50 hrs



Course Code: DAS0101B					Course Name: Engineering Physics							L	T	P	C
Course Offered in: B.Tech- First Semester BT												3	0	0	3
Pre-requisite:															
1. Unit and dimensions.															
2. Atomic structure and atomic spectra.															
3. Properties of matter.															
4. Basics of heat and thermodynamics.															
5. Basics of biological systems.															
Course Objectives:															
1.To provide the knowledge of measurement and errors and their uses in engineering applications															
2.To provide the knowledge of motions and their uses in engineering applications.															
3.To provide the knowledge of the basic concept of thermodynamics and its uses to engineering applications.															
4.To provide the knowledge of Crystallography and its uses to engineering applications.															
5. To provide the basic knowledge of fundamental principles underlying the physical properties and behavior of biological systems.															
Course Outcome: After completion of the course, the student will be able to:												Bloom's Knowledge Level (KL)			
CO1	Implement various measurement techniques to engineering applications.											K3			
CO2	Describe the knowledge of kinematics and dynamics.											K2			
CO3	Use the phenomenon of thermodynamics in engineering applications.											K3			
CO4	Calculate the various parameters of crystal structures											K3			
CO5	Explain fundamental principles underlying the physical properties and behavior of biological systems.											K2			
CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)															
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2		
CO1	3	2	1	-	2	1	-	-	-	-	2	-	-		
CO2	3	2	1	-	2	1	-	-	-	-	2	-	-		
CO3	3	2	1	-	2	1	-	-	-	-	2	-	-		
CO4	3	2	2	-	1	1	-	-	-	-	2	-	-		
CO5	3	2	2	-	1	1	-	-	-	-	2	-	-		
Course Contents / Syllabus															
Unit 1				Measurement and errors								9 hours			
Introduction to Measurement, Systems of Units and standards, Measurement Errors and Uncertainty, Types of Error, Statistical Analysis, Probability of Errors, Limiting Errors. Calibration and Standards, Data Recording and Analysis, Relevant problems, Instruments of measurements.															
Unit 2				Kinematics and Dynamics								9 hours			
Introduction to motion (definition of kinematics and its relation to mechanics), Velocity, Acceleration, Types of motion (rectilinear, curvilinear, relative), Coordinate system, Graphical representation of motion.															
Newton's law of motion, Mass and Weight, Work energy theorem, Impulse and momentum, Rotational dynamics (Torque, moment of inertia, Angular momentum, K.E of rotation.															

Unit 3	Thermodynamics	9 hours
Zeroth law of Thermodynamics, First law of Thermodynamics & its applications, Second law of Thermodynamics, Concept of Engine, Efficiency of Engine, Third law of Thermodynamics, Entropy, Change in entropy in reversible and irreversible processes		
Unit 4	Crystal Physics	9 hours
Crystalline and Non-Crystalline Materials, Crystal systems and Bravais lattices, Space lattices of Cubic systems, Miller indices, Relation between inter-planer distance and cube edge, Crystal structure of NaCl and Diamond, Atomic Packing Factor of the Cubic system, Relation between Lattice constant and Density. Diffraction of X-rays by crystal planes, Bragg's law.		
Unit 5	Introduction to Biophysical Concepts	9 hours
Basics of Membrane Physics (surface tension, permeability), Electrical properties of Biological Cells (basic bioelectricity), Molecular forces in Biology (van der Waals, hydrogen bonding), Overview of Optical and Electrical Bioinstrumentation, Concept of Molecular Machines and Motors.		
Total Lecture Hours		45 hours
Textbook:		
S.No	Book Title	Author
1	Engineering Physics	R. K. Gaur and S. L. Gupta
Reference Books:		
S.No	Book Title	Author
1	Measurements and Instrumentation	A. K. Sawhney
2	Engineering Metrology and Measurements	Krishnamurthy and Raghavendra
3	Theory of Machines	S.S. Rattan
4	Materials Science and Engineering	V. Raghavan
5	Heat and Thermodynamics	Mark Zemansky
6	Engineering Thermodynamics	P. K. Nag
7	Biophysics: An Introduction	Rodney Cotterill
Self-Study Content Links:		Duration (in Hrs)
MOOCs	https://www.coursera.org/learn/thermodynamics-intro https://www.coursera.org/learn/crystal-structures-and-properties-of-metals	16hrs 24hrs
Video Lectures	Unit 1 https://youtu.be/l4PAyQ9k_AY?si=sOLM1v5XkKcZKhPo https://youtu.be/TfhzDoEYh7c?si=Lw0DcisHyf6n68Cn https://youtu.be/5E56rXHu_zY?si=4bc_la1xI9tmsf47 https://youtu.be/hXveouH5R18?si=7Ni9cXetjOu2A9ki https://youtu.be/HQdy2Z-GmdY?si=q4mUKoxWi3O4ns0o https://youtu.be/DgMdre5q0tc?si=g4KwuG_bkO3nDycl https://youtu.be/D7xhPNTmKVg?si=7UW1sCtUxGKnSVO5 https://youtu.be/k_CoXqKDyuQ?si=wFARUeQSoZGMgJC Unit 2 https://www.youtube.com/watch?v=rIZgvSsTE5A https://www.youtube.com/watch?v=aegZOGZRng0 https://www.youtube.com/watch?v=LBMHPeJNB4E https://www.youtube.com/watch?v=iX44a9rlXhQ https://www.youtube.com/watch?v=DOVks_ZI3oQ https://www.youtube.com/watch?v=igcJfwu9rvG	0:31:04 0:33:27 0:30:38 0:32:48 0:58:27 01:02:19 00:55:04 00:52:50 00:54:15 00:32:10 00:43:10 00:47:20 00:52:10 00:51:04

	https://www.youtube.com/watch?v=rN8wJCTV18o https://www.youtube.com/watch?v=rQH0Lof206M https://www.youtube.com/watch?v=B59vpaQOMOY Unit 3 https://www.youtube.com/watch?v=9GMBpZZtjXM https://www.youtube.com/watch?v=52q5_Y6nnPU https://www.youtube.com/watch?v=5l-aJiugEsQ https://www.youtube.com/watch?v=YJXKjh1qXYI https://www.youtube.com/watch?v=sUDfpFD0xX4 https://www.youtube.com/watch?v=F_flGosPY8o https://www.youtube.com/watch?v=dkm2NO97IMk https://www.youtube.com/watch?v=umV67dqWVKw https://www.youtube.com/watch?v=c5v1b5pCL40 Unit 4 https://youtu.be/Il6jntngTk8?si=mXasZmOfaPVztcBh https://youtu.be/350iKwtDr-w?si=-EzhCbPypcTjBRF9 https://youtu.be/6bnHyi5ibDs?si=PKcbK-Y5l7hFzkno https://youtu.be/M0DniudbbY8?si=y9i9rIBUmY3KgD3l https://youtu.be/uB3oMoHujfU?si=ofnFQOG8lXcj6WxF https://youtu.be/4qQsBMABGU4?si=sonEC9U_jAMBribi https://youtu.be/cqesAE3Tn-M?si=7rej2L75NcZBs3AO https://youtu.be/Sz_hNFerHhU?si=sid_0MBUHT3H4OvF https://youtu.be/IfaoO5gvwb0?si=Rk0v5vr1iqxPdGAh https://youtu.be/Sv1vG7D8Ufo?si=HOH2cpPfwZu2OUz https://youtu.be/8rFvhbrtcbE?si=fUXBOZNhOiIXFVze https://youtu.be/hzG6K7fONac?si=EyBX9rCbJ-LuTY2Y https://youtu.be/zZvMBh6AS9c?si=AwEaYuG5wOT75_2a https://youtu.be/2SsrBQVO86c?si=U6stuNaWjWyz3u6R https://youtu.be/J68lucvEBXE?si=9I_5zHIEqKYJM9Uf https://youtu.be/UyFaejK9vhM?si=e_daVJKlmNEva_Ww https://youtu.be/ouottg_B9ko?si=0MS0J1YYZ3B4X6i https://youtu.be/945AbhMjCVQ?si=SVFa9BXyWfNJMhpC https://youtu.be/UXqWixel_f8?si=AVnrtp6QG1lxytVc https://youtu.be/USpTJVeRzkQ?si=bkCUNyLVdyALSnCg https://youtu.be/XnoiahNVgrY?si=oiHqH5LzvBWMb0Fz https://youtu.be/Twdlgj4C_DQ?si=jf35OZF55Mc87l6P https://youtu.be/TF-GM_Za7Sg?si=De3JYtdaXLZj_iPC https://youtu.be/QvtS-BngCxY?si=Fv6S0zaTwpU6yhms https://youtu.be/Lb72Z8rEmNE?si=qkBCpnA74pwgDbHk https://youtu.be/yBBgoUHCgTM?si=rUb4o8-bbV2NWYdD https://youtu.be/BX4XoCpj76U?si=KqiuUWfFigMF3U-Y https://youtu.be/oNZE8qlzyE?si=gdGmpZS2L1fiHF68 https://youtu.be/TUsmZqRWqck?si=fRDaYgn7SH8LkR13 Unit 5 https://www.youtube.com/watch?v=ttP1gUvETTM https://www.youtube.com/watch?v=YsTb586AO0E https://www.youtube.com/watch?v=_dhP_256xkg https://www.youtube.com/watch?v=qsDHywBVJzY https://www.youtube.com/watch?v=GF6XmbLgK5w https://www.youtube.com/watch?v=A-RI45pjJHo https://www.youtube.com/watch?v=EVIKFGB97_U https://www.youtube.com/watch?v=A-RI45pjJHo https://www.youtube.com/watch?v=RJE9yhJatbk https://www.youtube.com/watch?v=s5HA3dwAurk https://www.youtube.com/watch?v=a7H4bl1_z-k https://www.youtube.com/watch?v=znByTtoEKyQ https://www.youtube.com/watch?v=KJXw1fbTclU	00:54:40 00:49:15 00:48:32 00:53:23 00:54:15 00:52:10 00:51:04 00:54:40 00:49:15 00:48:32 00:32:10 00:43:10 00:24:36 00:23:11 00:19:00 00:22:12 00:18:00 00:16:29 00:24:45 00:25:02 00:27:36 00:25:19 00:15:00 00:19:35 00:19:53 00:14:38 00:31:55 00:11:10 00:18:12 00:07:44 00:32:13 00:33:44 00:30:38 00:31:44 00:29:51 00:31:15 00:32:18 00:36:31 00:35:17 00:35:59 00:35:41 00:47:20 00:54:15 00:52:10 00:51:04 00:54:40 00:49:15 00:48:32 00:32:10 00:13:26 00:43:10 01:02:24 00:44:13 00:53:23
Web References		

Course Code: DCSAI0101						Course Name: Fundamentals of Artificial Intelligence						L	T	P	C
Course Offered in: B.Tech- First Semester BT												2	0	0	2
Pre-requisite: Basic Programming, Basic Data Interpretation Skills															
Course Objectives: This subject aims to introduce students to the core principles, branches, applications, tools, and ethical considerations of Artificial Intelligence, empowering them with essential theoretical knowledge and practical skills to explore intelligent systems and pursue advanced AI research and development.															
Course Outcome: After completion of the course, the student will be able to												Bloom's Knowledge Level (KL)			
CO1	Explain the foundations of Artificial Intelligence and its historical evolution											K2			
CO2	Interpret and differentiate types of data											K3			
CO3	Develop Python-based data processing workflows											K3			
CO4	Analyze the impact and real-world applications of AI											K4			
CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)															
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	
CO1	3	2	-	-	2	-	-	-	-	-	-	1	1	2	
CO2	2	3	-	-	2	-	-	-	-	-	-	1	1	2	
CO3	2	2	2	2	3	-	-	-	-	-	-	1	2	2	
CO4	2	2	2	2	3	2	1	2	-	-	-	1	1	2	
Course Contents / Syllabus															
Unit 1				Introduction to AI								8 hours			
Introduction to AI – History, Approaches and Philosophy, Application of AI, Intelligent Agent, Types of Agent, Domains of AI- Machine Learning, Deep Learning, Natural Language Processing, Computer Vision, Generative AI															
Unit 2				Data Literacy and Analysis								8 hours			
Importance of Data, Information, Knowledge, Wisdom, Types of Data [Unstructured, Structured], Data Collection, Data Processing, Data Analysis – Descriptive and Inferential.															
Unit 3				Compute, Analysis and Visualization								10 hours			
Introduction to Python, Libraries (Pandas, NumPy, Matplotlib), Import and Export of Data, IDE, Google Colab, Kaggle Kernel.															
Unit 4				Applications of AI								4 hours			
AI in Healthcare, Finance, Agriculture, Transportation, Retail and E-commerce, Entertainment and Media, Smart Homes and IoT, Robotics and Automation															
Total Lecture Hours												30 hours			
Textbook:															
S.No	Book Title										Author				
1	Artificial Intelligence: A Modern Approach, Pearson Education, 4 th Edition, 2020										Stuart Russell & Peter Norvig				

2	Artificial Intelligence, McGraw-Hill Education, 3rd Edition, 2009	Elaine Rich, Kevin Knight, Shivashankar B. Nair
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Reference Books:

S.No	Book Title	Author
1	Artificial Intelligence and Machine Learning, Dreamtech Press, 1st Edition, 2020	P. S. Deshpande
2	Python Data Analytics: With Pandas, Numpy, and Matplotlib, Apress; 2nd edition (1 January 2018)	Wolfgang Ertel

Self-Study Content Links:

		Duration (in Hrs)
MOOCs	1. https://swayam-plus.swayam2.ac.in/courses/course-details?id=P_SMARTBRIDGE_01	90 Hrs
	2. https://www.udemy.com/course/artificial-intelligence-in-the-classroom/?utm_campaign=BG-Search_DSA_Beta_Prof_la.EN_cc.India&utm_source=bing&utm_medium=paid-search&portfolio=Bing-India&utm_audience=mx&utm_tactic=nb&utm_term=.ag_1318316830212069.ad.kw_Teacher+Training+en&utm_content=o&funnel=&test=&utm_campaign_id=638596187&msslkid=df2935f4c5d1177d62255fb858b9eda4&couponCode=PMNVD2025	8 Hrs 45 Min
	3. https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01333063698060902494_shared/overview	10 Hrs 45 Min
Video Lectures	1. https://www.youtube.com/watch?v=D1eL1EnxXXQ	1 Hrs 6 Mins
	2. https://www.youtube.com/watch?v=qrMnoY8qBJM	1 Hrs 13 Min
	3. https://www.youtube.com/watch?v=GHpchgLoDvI&list=PLp6ek2hDcoNB_YJCruBFjhF79f5ZHyBuz	32 Hrs
Web References	1. https://www.ibm.com/think/topics/artificial-intelligence	10 Hrs



LAB Course Code: DAS0151B				LAB Course Name: Engineering Physics Lab								L	T	P	C
Course Offered in: B.Tech- First Semester BT												0	0	2	1
Pre-requisite: Least count, Screw gauge, Vernier calipers															
Course Objectives:															
1. To provide the practical knowledge of the thermal and electrical conductivity.															
2. To provide the practical knowledge of the measuring techniques.															
3. To provide the practical knowledge of the flow of liquid and electrochemical equivalent.															
4. To provide the practical knowledge of the ultrasonic waves and X-rays.															
5. To provide the practical knowledge of nanoparticles and thin films.															
Course Outcome: After completion of the course, the student will be able to:												Bloom's Knowledge Level (KL)			
CO1	Understand the practical knowledge of the thermal and electrical conductivity.											K2			
CO2	Apply the practical knowledge of the measuring instruments.											K3			
CO3	Analyze the flow of liquid and electrochemical equivalent.											K4			
CO4	Understand the practical knowledge of the ultrasonic waves and X rays.											K2			
CO5	Create the nanoparticles and thin films.											K6			
CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)															
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2		
CO1	2	-	-	-	2	-	2	1	2	1	1	-	-		
CO2	3	-	-	-	2	-	1	1	2	1	1	-	-		
CO3	3	-	-	-	2	-	1	1	2	1	1	-	-		
CO4	2	-	-	-	2	-	1	1	2	1	1	-	-		
CO5	3	-	-	-	2	-	1	1	2	1	1	-	-		
List of Practical's (Indicative & Not Limited To)															
1. To determine the thermal conductivity of a metallic rod by Searle's method.															
2. Use of Vernier Calipers to (i) measure diameter of a small spherical/cylindrical body, (ii) measure the dimensions of a given regular body of known mass and hence to determine its density; and (iii) measure the internal diameter and depth of a given cylindrical object and hence to calculate its volume.															
3. To measure the thickness of the given glass plate using Screw Gauge.															
4. To measure the thickness of the given glass plate using Spherometer															
5. To determine the value of 'g' by using a Simple Pendulum.															

6. To determine E. C. E. of copper using tangent galvanometer.
7. Calibration of voltmeter/ammeter using potentiometer.
8. Determination of ultrasonic waves velocity in liquid media.
9. To determine the Temperature Coefficient of Resistance by Platinum Resistance Thermometer (PRT).
10. To determine the Coefficient of viscosity of a liquid.
11. Determine mechanical equivalent of heat by electrical method.
12. Thermal conductivity of a metal by Forbe's method.
13. Analysis of crystal structure of X ray diffractogram.
14. Synthesis of Nanoparticles by chemical route.
15. To synthesize the Thin Films using Sol-Gel Spin Coating system.
Total Hours: 30 hrs.



LAB Course Code: DCSE0151					LAB Course Name: C Programming								L	T	P	C
Course Offered in: B.Tech- First Semester BT													0	0	4	2
Pre-requisite: Basic Mathematics and Number Systems																
Course Objectives: The objective of a C programming course is to provide students with a solid foundation in the C programming language. The course aims to familiarize students with the syntax, concepts, and principles of C programming, as well as develop their ability to write efficient and effective C code. They will be able to develop complex real-world applications.																
Course Outcome: After completion of the course, the student will be able to													Bloom's Knowledge Level (KL)			
CO1	Understand the fundamentals, flowcharts, program structure, data types, operators, and the compilation process to develop error-free and logically correct programs.												K2			
CO2	Apply modular and efficient programs using conditional branching, loops, functions (including recursion), input/output operations, storage classes, and pointers.												K3			
CO3	Implement and manipulate one-dimensional and two-dimensional arrays and strings, applying them to solve problems like searching, sorting, matrix operations, structures, unions and file handling.												K3			
CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)																
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	PSO4	
CO1	3	3	1	2	2	1	1	1	3	1	2	3	2	1	2	
CO2	3	2	3	2	2	1	1	1	1	1	2	3	2	1	2	
CO3	3	3	3	2	3	2	1	1	1	1	1	3	2	1	2	
Course Contents / Syllabus																
Unit 1			Introduction to Algorithm and C Program												12 hours	
Computer systems, Types of Software's, Linker, Loader Types of Computing Environments, Evolutional of Programming Languages Machine Language, Assembly Language, high level low level, Compilers etc, Introduction to Algorithms: Definition, Properties of Algorithms, pseudocode and Flowchart, Algorithm vs Pseudocode. Programming Using C: C Tokens (Constants, variables, keywords), Datatypes, formatted and unformatted I/O functions, Structure of C program, Overview of compilation and execution process, Compiler vs Interpreter, Assembler, transition from algorithm to program, Syntax, logical errors, runtime errors, object and executable code, Application of C Programming.																
Unit 2			Expression & Statements												12 hours	
Operators and their types, Arithmetic expressions, and precedence: operators, operator precedence and associativity, type conversion. Control statements -Conditional Statements (if, else-if, nested if else, switch statements) use of break, and default with switch, Iteration and loops: Concept of loops, for, while, and do-while; while, multiple-loop variables; use of break and continue statements; nested loop, Expression statements-Null, Expression, Return, Compound statements. Array notation and one-dimensional arrays, Declaration of one-dimensional arrays, initialization of one-dimensional arrays, Example programs: (searching and sorting), Two-dimensional arrays, declaration of Two-dimensional arrays, Initialization of Two-dimensional																

Arrays, Example programs: Matrix multiplication, transpose of a matrix.

Strings: Declaring and Initializing String Variables, Reading Strings from Terminal, Writing Strings to Screen, Arithmetic Operations on Characters, String-handling Functions, Example Programs (with and without using built-in string functions).

Unit 3	Functions & Pointers	12 hours
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Functions: Introduction to function, function, Built in Function, User defined functions, types of functions, passing parameters to techniques: call by value, call by reference. Recursion: Definition, Types of Recursive Functions, Attributes value, scope of variable, address, local and global variables, Nesting of scope Storage classes: Auto, Register, static, and External.

Pointers: defining and declaring pointer, & and * Operators, pointer arithmetic and scaling, Dangling Pointers, Void and Null Pointer, wild Pointer, Pointer and Array, Array of Pointer, Pointer & Structure.

Unit 4	Structure & Union	12 hours
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Introduction, Initializing, defining, and declaring structure, Nesting Structures, accessing members, Operations on individual Structure within structures Array of structure, Structure Padding and Alignment

Union: Introduction, Initializing, defining, and declaring structure, Accessing members, Operations on individual members, Operations on the union, Difference between Structure and Union. Enumerations and typedef.

Unit 5	Memory Allocation and File Handling	12 hours
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Dynamic Memory Allocation: Introduction, Library functions malloc, calloc, realloc, and free.

File Handling: Introductory Concepts of File Stream. File Types-text, Binary Files, File Opening Modes, Input Output operations on File (getc() ,putc(),fprintf(),fscanf(),getw(), File Positioning functions -fseek.

Total Lecture Hours	60 hours
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Textbook:

S.No	Book Title with publication agency & year	Author
1	C: The Complete Reference, McGrawHill,4thEdition,2002.	Herbert Schildt
2	Computer Concepts and Programming in C, PHI Learning Pvt. Ltd., 2nd Edition, 2004.	E Balaguruswami,
3	Let Us C, BPB Publications, 19th Edition, 2022	Yashwant P.Kanetkar.
4	Mastering C, McGraw-Hill Education, 2nd Edition, 2010.	K.R Venugopal
5	Working with C, BPB Publications, 1996.	Yashwant P. Kanetkar

Reference Books:

S.No	Book Title with publication agency & year	Author
1	The C programming, Pearson Education	Kernighan Brain W.and Ritchie Dennis M
2	Computer Science-A Structured Programming Approach Using C,Third Edition, Cengage Learning-2007.	Behrouz A. Forouzan, RichardF. Gilberg, Thomson,
3	Computer Basics and C Programming, PHI Learning pvt. Limited,2015.	V. Rajaraman
4	Schrum's Outline of Programming with C,McGraw-Hill	Byron ,Gottfried
5	Computer Fundamentals and Programming in C,Oxford Publication	Reema Thareja

Self-Study Content Links:	Duration (in Hrs)
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MOOCs	1. Programming in C https://onlinecourses.nptel.ac.in/ 2. Problem Solving Through Programming in C https://swayam.gov.in/ 3. Joy of Computing using Python (Algorithmic Thinking) https://swayam.gov.in/ 4. C Programming for Beginners https://www.udemy.com/topic/c-programming/ 5. C Programming Bootcamp https://www.udemy.com/	8 week 8 weeks 12 weeks 26 hours 44 hours
Video Lectures	Unit 1: Introduction to C Programming https://youtu.be/XM7f5x94068 Unit 2: Operators, Loops and Decision Making https://youtu.be/FYdYkiIHvRQ Unit 3: Functions and Pointers https://youtu.be/IVD74GSU-3w Unit 4 : Structures and Unions https://www.youtube.com/results?search_query=structures+and+unions+in+c+neso+academy Unit 5: Dynamic Memory Allocation https://www.youtube.com/results?search_query=dynamic+memory+allocation+in+c+programming	3h 46m 31m 3hrs 47m 3hr 53m 31m
Web References	Wikibooks – C Programming https://en.wikibooks.org/wiki/C_Programming A Little C Primer https://en.wikibooks.org/wiki/A_Little_C_Primer	

Lab No.	Unit	Title of Program	CO Mapping
1.1	1	Write a C program to print "Hello, World!" and understand the basic structure of a C program.	CO1
1.2	1	Write a C program to demonstrate different data types (int, float, double, char) and use sizeof() operator.	CO1
1.3	1	Write a C program to demonstrate all arithmetic operators and understand operator precedence.	CO1
1.4	1	Write a C program using if, else-if, nested if-else to determine grade from marks.	CO1
1.5	1	Write a C program to implement a simple calculator using switch-case statement.	CO1
1.6	1	Write a C program demonstrating for, while, and do-while loops with break and continue.	CO1
1.7	1	Write a C Program to implement a half pyramid of *	CO1
1.8	1	Write a C Program to implement a Half pyramid of numbers	CO1
1.9	1	Write a C Program to implement a half pyramid of alphabets	CO1
1.10	1	Write a C Program to implement an inverted half pyramid of *	CO1
1.5	1	Write a C Program to implement an inverted half pyramid of numbers	CO1
1.6	1	Write a C Program to implement a full pyramid of *	CO1
1.7	1	Write a C Program to implement a full pyramid of numbers	CO1
1.8	1	Write a C Program to implement an inverted full pyramid of *	CO1
1.9	1	Write a C Program to implement Pascal's triangle	CO1
1.10	1	Write a C Program to implement Floyd's triangle	CO1
1.11	1	C Program to Print Diamond Pattern	CO1
1.12	1	C Program to Print Binary Triangle Pattern	CO1
1.13	1	C Program to Print Character Triangle	CO1
1.14	1	Star Pattern Programs in C	CO1
1.15	1	Pyramid Patterns in C	CO1

1.16	1	Write a C program for a matchstick game being played between the computer and a user. Your program should ensure that the computer always wins. Rules for the game are as follows: There are 21 matchsticks. The computer asks the player to pick 1, 2, 3 or 4 matchsticks. After the person picks, the computer does its picking. – Whoever is forced to pick up the last matchstick loses the game.	CO1
1.17	1	Write a program that plays tic-tac-toe. The tic-tac-toe game is played on a 3x3 grid the game is played by two players, who take turns. The first player marks move with a circle, the second with a cross. The player who has formed a horizontal, vertical, or diagonal sequence of three marks wins. Your program should draw the game board, ask the user for the coordinates of the next mark, change the players after every successful move, and pronounce the winner.	CO1
1.18	1	Design a calculator that performs Number system conversion	CO1
1.19	1	C Program to Simulate a Simple arithmetic Calculator	CO1
1.20	1	C Program to Evaluate the Given Polynomial Equation	CO1
1.21	1	C Program to Find Mean, Variance and Standard Deviation	CO1
1.22	1	C Program to Add Two Complex Numbers	CO1
1.23	1	C Program to Find Power of a Number	CO1
1.24	1	C Program to Calculate Pow (x,n)	CO1
1.25	1	C program to Find the Sum of Arithmetic Progression Series	CO1
1.26	1	C program to Find the Sum of Geometric Progression Series	CO1
1.27	1	C program to Find the Sum of Harmonic Progression Series	CO1
1.28	1	C Program to Find Sum of Series $1 + 1/2 + 1/3 + 1/4 + \dots + 1/N$	CO1
1.29	1	C Program to Find Sum of Series $1^2 + 2^2 + \dots + n^2$	CO1
1.30	1	C Program to Find Sum of Series $1^3 + 2^3 + 3^3 + \dots + n^3$	CO1
1.31	1	C Program to Find Sum of the Series $1/1! + 2/2! + 3/3! + \dots + 1/N!$	CO1
1.32	1	Design a program which displays following options on screen Figure Exit Enter Choice Once valid choice is entered it executes further. If choice one is entered, then it should display TRAINGLE SQUARE RHOMBUS TRAPEZIUM RETURN TO PREVIOUS MENU ENTER CHOICE Once valid choice is entered it executes further. After that it ask for specific data and prints the area and volume and perimeter/circumference of the respective figure. After that a choice is to be asked for	CO1
1.33	1	Do you wish to continue (Y/N)? And should work accordingly. Before every menu, the screen should be cleared.	CO1

1.34	1	C Program to Find the Largest Number Among Three Numbers	CO1
1.35	1	C Program to Find the Roots of a Quadratic Equation	CO1
1.36	1	C Program to Check Leap Year. Evaluate all the cases.	CO1
1.37	1	C Program to Check Whether a Number is Positive or Negative	CO1
1.38	1	C Program to Check Whether a Character is an Alphabet or not	CO1
1.39	1	C Program to Calculate the Sum of Natural Numbers	CO1
1.40	1	C Program to Find Factorial of a Number	CO1
1.41	1	C Program to Generate Multiplication Table	CO1
1.42	1	C Program to Display Fibonacci Sequence	CO1
1.43	1	C Program to Find GCD of two Numbers	CO1
1.44	1	C Program to Find LCM of two Numbers	CO1
1.45	1	C Program to Display Characters from A to Z Using Loop	CO1
1.46	1	C Program to Reverse a Number using looping concepts	CO1
1.47	1	C Program to Check Whether a Number is Palindrome or Not	CO1
1.48	1	C Program to Check Whether a Number is Prime or Not	CO1
1.49	1	C Program to Check Armstrong Number	CO1
1.50	1	C Program to Display Armstrong Number Between Two Intervals	CO1
1.51	1	C Program to Display Factors of a Number	CO1
1.52	1	C Program to Reverse a Number using looping concepts	CO1
1.53	1	C Program to Check Whether a Number is Palindrome or Not	CO1
1.54	1	C Program to Check Whether a Number is Prime or Not	CO1
1.55	1	C Program to Check Armstrong Number	CO1
1.56	1	C Program to Display Armstrong Number Between Two Intervals	CO1
1.57	1	C Program to Display Factors of a Number	CO1
1.58	1	C Program to Make a Simple Calculator Using switch...case	CO1
1.59	1	C Program to Check Whether a Number is Even or Odd	CO1
1.60	1	C Program to Check Whether a Character is a Vowel or Consonant	CO1
1.61	1	C Program to Find the Largest Number Among Three Numbers	CO1
1.62	1	C Program to Check Whether a Number is Positive or Negative	CO1
1.63	1	C Program to Calculate the Sum of Natural Numbers	CO1
1.64	1	C Program to Find Factorial of a Number	CO1
1.65	1	C Program to Generate Multiplication Table	CO1
1.66	1	C Program to Display Fibonacci Sequence	CO1
1.67	1	C Program to Display Prime Numbers Between Intervals Using Function	CO1
1.68	1	C Program to Check Prime or Armstrong Number Using User-defined Function	CO1
1.69	1	C Program to Check Whether a Number can be Expressed as Sum of Two Prime Numbers	CO1
1.70	1	C Program to Find the Sum of Natural Numbers using Recursion	CO1
2.1	2	Write a C program demonstrating formatted input and output using scanf() and printf() with various format specifiers and field widths.	CO2
2.2	2	Write a C program to find the roots of the equation $ax^2 + bx + c = 0$ using the discriminant.	CO2
2.3	2	Write C programs to (a) print Fibonacci series, (b) check prime number, (c) check Armstrong number.	CO2

2.4	2	Write a C program demonstrating function definition, call by value, and different types of functions (no-arg, with-arg, return value).	CO2
2.5	2	Write a C program to implement recursive functions for finding the reverse of a number and checking palindrome.	CO2
2.6	2	C Program to Find Factorial of a Number Using Recursion	CO2
2.7	2	C Program to Find G.C.D Using Recursion	CO2
2.8	2	C Program to Convert Binary Number to Decimal and vice-versa	CO2
2.9	2	C program to calculate the power using recursion	CO2
2.10	2	C Program to Check Prime or Armstrong Number Using User-defined Function	CO2
2.11	2	C Program to Find the Sum of Natural Numbers using Recursion	CO2
2.12	2	Design a calculator	CO2
2.13	2	Design a Menu Driven program which performs the functions as per the menu Add Details of students Search the student data Display the records Name must not be blank, and first letter should be alphabet Student details should contain Name. Age, Class, Roll-No Exit Enter the Choice: Note: Choice must be between 1-4 Only. Other than that, an error message must be displayed and entry should be done again	CO2
2.14	2	C Program to Add Two Numbers Using Recursion.	CO2
2.15	2	C Program to find the sum of digits of a number using recursion.	CO2
2.16	2	Write a method in C that will remove any given character from a string.	CO2
3.1	3	Write a C program demonstrating function definition, call by value, and different types of functions (no-arg, with-arg, return value).	CO3
3.2	3	C Program to Calculate Average Using Arrays	CO3
3.3	3	C Program to Find Largest Element in an Array	CO3
3.4	3	C Program to search an element	CO3
3.5	3	C Program to Add Two Matrices Using Multi-dimensional Arrays	CO3
3.6	3	C Program to Multiply Two Matrices Using Multi- dimensional Arrays	CO3
3.7	3	C Program to Find Transpose of a Matrix	CO3
3.8	3	Write a C program to declare a pointer, store the address of a variable in it, and display the value and address of the variable using the pointer.	CO3
3.9	3	C Program to Access Array Elements Using Pointer	CO3
3.10	3	Write a C program to swap two numbers using pointers and a user-defined function.	CO3
3.11	3	C Program to Calculate Average Using Arrays	CO3
3.12	3	C Program to Find Largest Number Using Dynamic Memory Allocation	CO3
3.13	3	C Program to Calculate Standard Deviation	CO3
3.14	3	C Program to Find the Frequency of Characters in a String	CO3
3.15	3	C Program to Count the Number of Vowels, Consonants and so on	CO3
3.16	3	C Program to Remove all Characters in a String Except Alphabets	CO3
3.17	3	C Program to Find the Length of a String	CO3
3.18	3	C Program to Concatenate Two Strings	CO3
3.19	3	C Program to Copy String Without Using strcpy()	CO3

3.20	3	C Program to Sort Elements in Lexicographical Order (Dictionary Order)	CO3
3.21	3	C Program to Find the Frequency of Characters in a String	CO3
3.22	3	Write a method in C which will remove any given character from a String.	CO3
3.23	3	Write a program in C to count occurrence of a given character in a String.	CO3
3.24	3	Write a program in C to check if two Strings are Anagram.	CO3
3.25	3	Write a program in C to check a String is palindrome or not.	CO3
3.26	3	C program to check given character is vowel or consonant.	CO3
3.27	3	C program to check given character is digit or not.	CO3
3.28	3	C program to replace the string space with a given character.	CO3
3.29	3	C program to convert lowercase char to uppercase of string.	CO3
3.30	3	C program to convert lowercase vowel to uppercase in string.	CO3
3.31	3	C program to delete vowels in a given string.	CO3
3.32	3	C program to count Occurrence Of Vowels & Consonants in a String.	CO3
3.33	3	C program to print the highest frequency character in a String.	CO3
3.34	3	C program to Replace First Occurrence Of Vowel With '-' in String.	CO3
3.35	3	C program to count alphabets, digits and special characters.	CO3
3.36	3	C program to separate characters in a given string.	CO3
3.37	3	C program to remove blank space from string.	CO3
3.38	3	C program to count blank space from string.	CO3
3.39	3	C program to concatenate two strings.	CO3
3.40	3	C program to remove repeated character from string.	CO3
3.41	3	C program to calculate sum of integers in string.	CO3
3.42	3	C program to print all non-repeating character in string.	CO3
3.43	3	C program to copy one string to another string.	CO3
3.44	3	C Program to sort characters of string.	CO3
3.45	3	C Program to sort character of string in descending order.	CO3
3.46	3	Write a program in C for, In array 1-100 numbers are stored, one number is missing how do you find it.	CO3
3.47	3	Write a program in C for, In a array 1-100 multiple numbers are duplicates, how do you find it.	CO3
3.48	3	Write a program in C to find first duplicate number in a given array.	CO3
3.49	3	Write a program in C to remove duplicate elements form array in C.	CO3
3.50	3	Write a program in C for, Given two arrays 1,2,3,4,5 and 2,3,1,0,5 find which number is not present in the second array.	CO3
3.51	3	Write a program in C for, How to compare two array is equal in size or not.	CO3
3.52	3	Write a program in C to find largest and smallest number in array.	CO3
3.53	3	Write a program in C to find second highest number in an integer array.	CO3
3.54	3	Write a program in C to find top two maximum number in array?	CO3
3.55	3	C program to print array in reverse Order.	CO3
3.56	3	C program to reverse an Array in two ways.	CO3
3.57	3	C Program to calculate length of an array.	CO3
3.58	3	C program to insert an element at end of an Array.	CO3
3.59	3	C program to insert element at a given location in Array.	CO3
3.60	3	C Program to delete element at end of Array.	CO3
3.61	3	C Program to delete given element from Array.	CO3

3.62	3	C Program to delete element from array at given index.	CO3
3.63	3	C Program to find sum of array elements.	CO3
3.64	3	C Program to print all even numbers in array.	CO3
3.65	3	C Program to print all odd numbers in array.	CO3
3.66	3	C program to perform left rotation of array elements by two positions.	CO3
3.67	3	C program to perform right rotation in array by 2 positions.	CO3
3.68	3	C Program to merge two arrays.	CO3
3.69	3	C Program to find highest frequency element in array.	CO3
3.70	3	Write a C program to compute factorial and Fibonacci using recursion, and solve the Tower of Hanoi problem.	CO3
4.1	4	Write a C program to implement (a) linear search and (b) bubble sort on a 1D array.	CO3
4.2	4	Write a C program to perform matrix multiplication and find the transpose of a matrix using 2D arrays.	CO3
4.3	4	Write a C program to perform string operations: length, copy, concatenate, compare, reverse – both using and without using built-in functions.	CO3
4.4	4	C Program to Store Information of a Student Using Structure	CO3
4.5	4	C Program to Store Information of Students Using Structure	CO3
4.6	4	C Program to Store Data in Structures Dynamically	CO3
4.7	4	C Program to Store Information of a Student Using Structure	CO3
4.8	4	C Program to Add Two Distances (in inch-feet system) using Structures	CO3
4.9	4	Snake Game Mini Project in C is a basic console program with no graphics. You may play the famous "Snake Game" in this project exactly as you would anywhere else. To move the snake, use the up, down, right, and left arrows. Food is placed at various co-ordinates on the screen for the snake to consume. The snake's length and score will both rise by one element each time it consumes the food.	CO3
5.1	5	Write a C program to demonstrate dynamic memory allocation using malloc(), calloc(), realloc(), and free().	CO3
5.2	5	C Program to Write a Sentence to a File	CO3
5.3	5	C Program to Read the First Line From a File	CO3
5.4	5	C Program to showcase use of DMA	CO3
5.5	5	C Program to Write a record to a File	CO3
5.6	5	C Program to Read the last Line From a File	CO3
5.7	5	Program to create a file using command line argument	CO3
5.8	5	Program to copy one file into another	CO3
5.9	5	Implement macro handling	CO3
5.10	5	Program to write a structure into a file and display its content	CO3
5.11	5	Program to search a record in a file	CO3
5.12	5	Program to implement multi line macro and Conditional Macros	CO3
5.13	5	Program to draw Circle/Rectangle/Triangle/ A Hut/with colors in it	CO3
5.14	5	Program to shut down/ sleep a system if not component is being touched	CO3
5.15	5	Write a program in C to create and store information in a text file.	CO3
5.16	5	Write a program in C to read an existing file.:	CO3
5.17	5	Write a program in C to write multiple lines to a text file.:	CO3
5.18	5	Write a program in C to read the file and store the lines in an array.	CO3
5.19	5	Write a program in C to find the number of lines in a text file.	CO3

5.20	5	Write a program in C to find the content of a file and the number of lines in a text file.	CO3
5.21	5	Write a program in C to count the number of words and characters in a file.	CO3
5.22	5	C Program to list all files and sub-directories in a directory	CO3
5.23	5	C Program to count number of lines in a file	CO3
5.24	5	C Program to print contents of file	CO3
5.25	5	C Program to copy contents of one file to another file	CO3
5.26	5	C Program to merge contents of two files into a third file	CO3
5.27	5	C Program to read records from a data file	CO3
5.28	5	C Program to count number of lines, words, characters, blank space in a file	CO3
5.29	5	C Program to Illustrate how User Authentication is Done	CO3
5.30	5	C Program to Shutdown Computer in Linux	CO3
5.31	5	C Program to Compute First N Fibonacci Numbers using Command Line Arguments	CO3
5.32	5	C Program to Generate Fibonacci Series using Command Line Argument	CO3
5.33	5	Design an ATM Simulation using C manage the information of workers working in a firm or organization using this Employee Management System. The file handling technique is used here to save the data in a particular file, and you get the notion of this project as soon as you hear the name. This project uses the Insert, Edit, and Delete file actions, but the sole constraint is that you can only display the data, not search for any data item in particular. If you have more experience with C, you may alter this program by using the searching strategies.	CO3
5.34	5	The following modules are included in this project. Add Employee Details Edit Employee details Modify Employee Delete Employee Create a Database using C file structure	CO3
5.35	5	A Library in charge is facing problems in handling books and customers. Design a solution using C regarding his problem	CO3
5.36	5	Design a Simple Result System in the C programming language. You can keep track of the pupils' grades and update them at any time. Students might be given marks based on their performance in each subject. The project is straightforward and straightforward to use. The system is written entirely in the C programming language.	CO3



LAB Code: DME0151		LAB Course Name: CAD & Digital Manufacturing		L	T	P	C
Course Offered in: B.Tech- First Semester BT				0	0	2	1
Pre-requisite: NIL							
Course Objectives: The objective of this lab is to enable students to understand and apply the fundamentals of CAD and digital manufacturing, including 2D drafting, 3D modeling, and 3D printing processes. Students will gain hands-on experience with design tools, slicing software, and post-processing techniques to develop functional digital-to-physical prototypes.							
Course Outcome: After completion of the course, the student will be able to				Bloom's Knowledge Level (KL)			
CO1	Understand the principles of 2D geometry and orthographic projection and apply them to manual and computer-aided drafting.			K3			
CO2	Develop 3D models of components using CAD tools and apply appropriate dimensioning and modeling techniques.			K3			
CO3	Identify the components of a 3D printer and understand the workflow from CAD file preparation to STL conversion for 3D printing.			K2			
CO4	Use slicing software to generate G-code from 3D models and analyze the slicing parameters, support structures, and print previews.			K3			
CO5	Perform 3D printing of parts and assemblies and demonstrate post-processing techniques to enhance surface finish, fit, and function.			K3			

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	1	-	-	2	1	1	1	1	1	1	2	2	3
CO2	3	1	-	1	3	2	1	1	1	1	1	2	3	3
CO3	3	2	2	1	3	3	1	1	2	1	1	2	3	2
CO4	3	1	-	-	2	3	2	1	2	1	1	2	2	2
CO5	3	2	2	1	3	3	2	1	2	1	1	2	3	3

List Of Practical's (Indicative & Not Limited To)

1. To introduce the user interface of CAD software and its elements/tools/commands.
2. To draw the sheet layout and title block using aligned system of dimensioning.
3. To apply the Aligned Dimensioning System to precisely reproduce the given 2D drawings using CAD software.
4. To accurately create and represent the given 2D drawing in CAD, utilizing the Aligned System of dimensioning.
5. To design the given 3D Component in CAD software, utilizing the Aligned System of dimensioning.
6. To design the given 3D Component in CAD software, utilizing the Unidirectional System of dimensioning and Layer Properties.

7. Introduction to 3D printer and explore features and specifications like Machine setting (e.g., Nozzle, Print Bed, etc.) for FDM 3D printer.
8. To upload the part and set up the position and orientation of the model (use of various commands like Move, Scale, Rotate, Mirror etc.) in slicing software.
9. To use slicing software for converting a 3D CAD model into a G code on cloud based slicing software and adding the reinforcing of layers of composites within slicing software.
10. To create the G-code file for 3D printing purpose using raft, brim and skirt in the slicing software to fulfill the adaptive need of 3d printer.
11. A case study on different types of 3D printers.

Textbook:

S.No	Book Title	Author
1	CAD/CAM: Computer Aided Design And Manufacturing	Azhar Wahab and SSR Krishna
2	CAD/CAM: Computer Aided Design And Manufacturing	Pearson Publication

Reference Books:

S.No	Book Title	Author
1	Engineering Drawing	N. D. Bhatt
2	3D Printing: A practical and hands-on textbook for mastering 3D printing technology	BPB Publications

Self-Study Content Links:

		Duration (in Hrs)
MOOCs	https://nptel.ac.in/courses/112104031	15 hrs
Video Lectures	https://nptel.ac.in/courses/113108632 https://www.youtube.com/watch?v=VtLXKU1PpRU	15 hrs
Web References	https://swayam-plus.swayam2.ac.in/courses/course-details?id=P_IITMPR_03 https://www.youtube.com/	



C05	Conduct a complete bio-data analysis project and present insights effectively.	
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CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	-	2	3	-	-	-	2	-	2	2	-	3
CO2	3	3	-	3	3	-	-	-	2	-	2	2	-	3
CO3	3	3	-	3	3	-	-	-	2	-	2	2	-	3
CO4	3	2	-	2	3	-	-	-	2	-	2	2	-	3
CO5	3	3	2	3	3	-	-	2	3	2	3	2	-	3

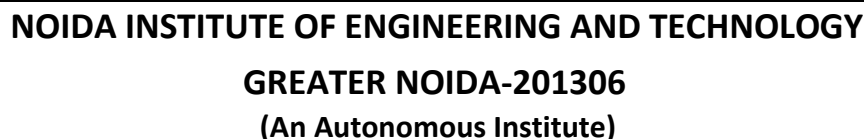
9. Raw Material and BMR Documentation: Simulate a BMR entry for a sixteen product
10. QA vs QC Practices: Case study analysis of a quality failure and root cause assessment



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11. Audits and Compliance : Conduct a peer-to-peer internal mock audit using checklist

12. Risk Assessment in GMP/GLP: Workshop: Perform a mini-FMEA for a laboratory or process scenario.



LAB Course Code: DASL0151		LAB Course Name: Acquiring Business Communication (ABC) Lab				L	T	P	C		
Course Offered in: B.Tech- First Semester CSE/CSE-TWIN/IT/IT-TWIN/CS/CSE(DS)/ CSE(IOT)/CSE(AI)/AI-TWIN /CSE(AIML)/CYS/ AIML-TWIN/ECE/ECE(VLSI)/ME/M.Tech(Integrated)/BT						0	0	4	2		
Pre-requisite: Comprehension of basic English language											
Course Objectives:											
1. To improve proficiency in the English language to the Intermediate level of CEFR (Common European Framework of Languages).											
2. To motivate students to look within and create a better version of ‘self.’											
3. To introduce the key concepts of etiquette and soft skills.											
Course Outcome: After completion of the course, the student will be able to											
S. No	Course Outcome					Bloom’s Knowledge Level (KL)					
CO1	Identify essential soft skills for the workplace					K1					
CO2	Apply effective listening skills					K3					
CO3	Acquire fluency and clarity of speech					K3					
CO4	Understand and analyse written texts					K4					
CO5	Create clear, correct, and concise written content					K6					
CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)											
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	-	-	1	1	1	1	1	1	2	3	1
CO2	1	1	1	1	1	1	1	1	2	3	1
CO3	1	1	1	1	1	1	1	1	2	3	1
CO4	1	2	2	2	2	2	2	1	2	3	1
CO5	2	1	2	1	2	1	2	1	2	3	1
List Of Practical											
1. Orientation											
a. Introduction to the course											
b. Introduction to the evaluation scheme & the British Council EnglishScore Tests											
Developing Communication Skills											
• Confidence building activities											
• Overcoming initial hesitations											
2. Anubhav Activity											
• The Students will share their own reservations and expectations from the course.											
Showcasing talents											
• Participants will gain confidence in expressing themselves through song/dance, overcome inhibitions, and develop a sense of freedom and creativity.											

3. Developing active listening and accurate communication skills

- The students will enhance their listening skills, practice conveying information accurately, and understand the importance of clear communication and active listening.

4. Language Toolbox 1: Vocabulary enrichment

- The students will be exposed to General Service List (GSL) by West and Academic Word List (AWL); the students will be asked to keep a journal of new words learnt every day.

5. Think-Pair-Share for Reading Comprehension

- The students will actively interact with the reading material by engaging in this activity, collaborating with their peers, and refining their comprehension skills.

6. Essentials of Writing – Requisites of a good sentence The students will learn to construct sentences which showcase clarity, consistency and correctness in structure, word usage and punctuation through activities like picture prompts and verbal clues.

7. Professional Introductions (Video recorded)

- The students will practice professional introductions with emphasis on clarity, correctness, voice modulation, and engaging content.

8. Listen and write

- The students will practice writing exactly what they hear.

Listen and Repeat

- The students will practice speaking, with correct pronunciation and intonation, what they hear.

9. Pronunciation

- Vowel & Consonant sounds which are difficult for Indian speakers
- Syllable division & accent

10. Reading Techniques for Time Management

- The students will be able to identify keywords, headings, and topic sentences. Further, they will be able to analyze and synthesize information from the selected texts.

11. Paragraph Writing (Unity, Cohesion, Emphasis)

- The students will learn to write with emphasis on correctness of grammatical structure, concord, voice, and tenses.

12. Language Toolbox 3: Vocabulary Building – Homophones, homonyms, synonyms, antonyms, phrases & idioms

- The students will be able to bring in variety in the usage of words.

13. Building formal attitude through language, dress, and behavior

- The students will understand the importance of formal dressing and professional behavior in academic and workplace settings.

14. Clarity in articulation

- The students will practice accent, rhythm, and intonation in connected speech (Ref. English Score – Speaking/ SVAR/ Versant/etc.)

15. Listening to follow directions and instructions precisely

- The students will improve their listening comprehension and enhance their ability to follow instructions & directions.

16. Speaking in front of an audience

JAM, Extempore

- The students will develop the ability to speak confidently and fluently in front of an audience by organizing their thoughts quickly, expressing ideas clearly, managing time effectively, and using appropriate body language, voice modulation, and eye contact to overcome stage fear and hesitation.

17. Analysing Caselets

- The students will improve their analytical and speaking skills by analysing & providing solutions to the issues in the caselets.

18. Basics of Email Writing

- The students will be able to write letters/applications on topics from real life scenarios.

19. Anubhav Activity

- The students will talk about their key takeaways from the sessions/test scores this far.

20. Analysing Speech/ Ted Talks

- The students will be able to improve their listening by analysing speeches by famous personalities/Ted Talks.

21. Sharing views in a group discussion

- The students will enhance their ability to express their opinions, actively listen to others, and engage in constructive discussions to develop well-rounded perspectives.

22. Decoding infographics

- The students will improve their ability to interpret and analyse information presented in diagrams, graphs, and pie charts.

23. Writing Essay

- The students will practice writing coherently, logically, precisely, and correctly on a wide variety of topics.

24. Anubhav Activity

The students will reflect on the semester and the road map ahead.

Total Hours: 60 hrs.

Self-Study Content Links:

		Duration (in Hrs)
MOOCs	NPTEL – “Soft Skills” by Prof. Binod Mishra, IIT Roorkee (covers effective communication, group discussion, interviews & presentations) – onlinecourses.nptel.ac.in	15
	Coursera – “Improve Your English Communication Skills” Specialization, Georgia Institute of Technology – coursera.org	25
Video Lectures	NPTEL/YouTube – “Communication Skills” by Prof. T. Ravichandran, IIT Kanpur (reading, writing, listening & speaking modules)	14
	English Speaking & Grammar” series, Learn English with Let's Talk (pronunciation, vocabulary & fluency practice)	10
Web References	Purdue Online Writing Lab (OWL) – Business Writing & Professional Correspondence – owl.purdue.edu	5
	BBC Learning English – Business English & Pronunciation modules – bbc.co.uk/learningenglish	8

Course Code: DASCC0101						Course Name: Design Thinking-I						L	T	P	C
Course Offered in: B.Tech- First Semester BT												2	0	0	2
Pre-requisite:															
Course Objectives: The objective of this course is to familiarize students with design thinking process as a tool for breakthrough innovation. It aims to equip students with design thinking skills and ignite the minds to create innovative ideas, develop solutions for real-time problems.															
Course Outcome: After completion of the course, the student will be able to												Bloom's Knowledge Level (KL)			
CO1	Develop a strong understanding of the design process and apply it in a variety of business settings											K1			
CO2	Analyze self, culture, and teamwork to work in a multidisciplinary environment and exhibit empathetic behavior											K3			
CO3	Formulate specific problem statements of real time issues and generate innovative ideas using design tools											K4			
CO4	Apply critical thinking skills to arrive at the root cause from a set of likely causes											K4			
CO5	Demonstrate an enhanced ability to apply design thinking skills for evaluation of claims and arguments											K4			
CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)															
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2		
CO1	1	2	2	1	1	1	2	1	2	2	2				
CO2	1	2	1	1	1	2	1	2	2	2	1				
CO3	1	2	1	2	2	1	2	1	2	2	1				
CO4	1	2	1	1	1	1	1	1	1	1	1				
CO5	1	2	1	1	1	1	1	1	1	1	1				
Course Contents / Syllabus															
Unit 1		Introduction												6 hours	
An overview of future skills, introduction to design thinking, traditional problem solving versus design thinking, history of design thinking, wicked problems. Innovation and creativity, the role of innovation and creativity in organizations, creativity in teams and their environments, design mindset. Introduction to elements and principles of design, 13 Musical Notes for Design Mindset, Examples of Great Design, Design Approaches across the world.															
Case Studies: Mumbai Dabbawallas, Gillette, Singapore, Bengaluru, Bahubali, Google, Embrace Incubator															
Activity: Observation, Wicked Problem															
Unit 2		Ethical Values and Empathy												6 hours	

Understanding humans as a combination of I (self) and body, basic physical needs up to actualization, prosperity, the gap between desires and actualization. Understanding culture in family, society, institution, startup, socialization process. Ethical behavior: effects on self, society, understanding core values and feelings, negative sentiments and how to overcome them, definite human conduct: universal human goal, developing human consciousness in values, policy, and character.

Understanding stakeholders, techniques to empathize with, identify key user problems. Empathy tools- Interviews, empathy maps, persona, emotional mapping, immersion and observations, Emotional Intelligence, customer journey maps, classifying insights after Observations, Classifying Stakeholders.

Case Studies: Pure-it, Royal Enfield, Big Basket, Air-bnb.

Activity: Moccasin Walk, Persona, Empathy map, Journey Map

Unit 3	Problem Statement and Ideation	6 hours
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Defining the problem statement, creating personas, Point of View (POV) statements. Research identifying drivers, information gathering, target groups, samples, and feedbacks. Idea Generation basic design directions, Themes of Thinking, inspirations and references, brainstorming, inclusion, sketching and presenting ideas, idea evaluation, double diamond approach, analyze – four W’s, 5 why’s, “How Might We”, Defining the problem using Ice-Cream Sticks, Metaphor & Random Association Technique, Mind-Map, ideation activity games - six thinking hats, million-dollar idea, introduction to visual collaboration and brainstorming tools - Mural, JamBoard, Introduction to AI Tools.

Case Studies: The Good Kitchen, Flipkart, Uber, Redbus, Big Bazaar

Activity: 5 Why, HMW, Brainstorming, Six Thinking Hats, 30 Circles, paper prototype

Unit 4	Critical Thinking	6 hours
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Fundamental concepts of critical thinking, the difference between critical and ordinary thinking, characteristics of critical thinkers, critical thinking skills- linking ideas, structuring arguments, recognizing incongruences, five pillars of critical thinking, argumentation versus rhetoric, cognitive bias, tribalism, and politics. Case study on applying critical thinking on different scenarios.

Case Studies: Byju’s, Maggi noodles, Tata Nano

Activity: debate, role play

Unit 5	Logic and Argumentation	6 hours
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The argument, claim, and statement, identifying premises and conclusion, truth and logic conditions, valid/invalid arguments, strong/weak arguments, deductive argument, argument diagrams, logical reasoning, scientific reasoning, logical fallacies, propositional logic, probability, and judgment, obstacles to critical thinking. Group activity/role plays on evaluating arguments.

Case Studies: Aadhaar Card, Demonetization, Odd-Even Policy, Jio

Activity: Logical Fallacy Detective, Fact-Checking Challenge

Total Lecture Hours 30 hours

Textbook:

S.No	Book Title	Author
1.	UnMukt : Science & Art of Design Thinking	Arun Jain
2.	Solving Problems with Design Thinking – Ten Stories of What Works	Jeanne Liedta
3.	A Foundation Course in Human Values and Professional Ethics	R R Gaur, R Sangal, G P Bagaria
4.	Critical Thinking: An Introduction	Fisher

Reference Books:

S.No	Book Title	Author
1.	101 Design Methods	Vijay Kumar
2.	Change by Design	Tim Brown
3.	How to improve your critical thinking & reflective kills	McMillan
4.	Design of Business	Roger L. Martin
Self-Study Content Links:		Duration (in Hrs)
MOOCs	1. https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_0127858770650972161567_shared/overview (Unit-1)	3hrs 31m
	2. https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_0142731169657896965/overview (Unit-2)	1hr 2 m
	3. https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01350158100362035211528/overview (Unit-3)	23m 32s
	4. https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01458327538792857631522/overview (Unit-4)	1hr 1m
	5. https://alison.com/course/problem-solving-and-critical-thinking-skills?utm_source	3-4Avg. hrs
Video Lectures	Unit-1 https://youtu.be/rUUuhnLkJ2s?si=XCHnDbt_U1z0	5m 31s
	Frx	1m 54 s
	https://www.youtube.com/watch?v=ldYzbV0NDp8	14m 26s
	https://www.youtube.com/watch?v=0Fi83BHQsMA	4m 19s
	Unit-2 https://www.youtube.com/watch?v=q654-kmF3Pc	2m 49s
	http://www.uhv.org.in/ https://swayam.gov.in/nd1_noc19_mg60/preview	(Way to Course)
	Unit-3 https://www.udemy.com/course/design-thinking-for-beginners/	47m
	https://www.interaction-design.org/literature/article/personas-why-and-how-you-should-use-them	1d 14hrs
	Unit-4 https://www.youtube.com/watch?v=CLQdlwOS3mg&t=16s	14m 10s
	https://www.criticalthinking.org/pages/defining-critical-thinking/766	Conference Paper
Web References	Unit-5 https://swayam.gov.in/nd2_aic19_ma06/preview	10 hrs



CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

Course Contents / Syllabus

Unit 1	Society State and Polity in India	6 hours
State in Ancient India: Evolutionary Theory, Force Theory, Mystical Theory Contract Theory, Stages of State Formation in Ancient India, Kingship , Council of Ministers Administration Political Ideals in Ancient India Conditions’ of the Welfare of Societies, The Seven Limbs of the State, Society in Ancient India, Purusārtha, Varnāshrama System, Āshrama or the Stages of Life, Marriage, Understanding Gender as a social category, The representation of Women in Historical traditions, Challenges faced by Women.		
Unit 2	Indian Literature, Culture, Tradition, and Practice	6 hours
Evolution of script and languages in India: Harappan Script and Brahmi Script. The Vedas, the Upanishads, the Ramayana and the Mahabharata, Puranas, Buddhist And Jain Literature in Pali,Prakrit And Sanskrit, Sikh Literature, Kautilya’s Arthashastra, Famous Sanskrit Authors, Telugu Literature, Kannada Literature,Malayalam Literature ,Sangama Literature Northern Indian Languages & Literature, Persian And Urdu ,Hindi Literature.		



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Unit 3	Indian Religion, Philosophy, and Practices	6 hours
Pre-Vedic and Vedic Religion, Buddhism, Jainism, Six System Indian Philosophy, Shankaracharya, Various Philosophical Doctrines , Other Heterodox Sects, Bhakti Movement, Sufi movement, Socio religious reform movement of 19th century, Modern religious practices.		
Unit 4	Science, Management and Indian Knowledge System	6 hours
Astronomy in India, Chemistry in India, Mathematics in India, Physics in India, Agriculture in India, Medicine in India , Metallurgy in India, Geography, Biology, Harappan Technologies, Water Management in India, Textile Technology in India ,Writing Technology in India Pyrotechnics in India Trade in Ancient India/,India's Dominance up to Pre-colonial Times.		
Unit 5	Cultural Heritage and Performing Arts	6 hours
Indian Architect, Engineering and Architecture in Ancient India, Sculptures, Pottery, Painting, Indian Handicraft, UNESCO'S List of World Heritage sites in India, Seals, coins, Puppetry, Dance, Music, Theatre, drama, Martial Arts Traditions, Fairs and Festivals, UNESCO'S List of Intangible Cultural Heritage, Calenders, Current developments in Arts and Cultural, Indian's Cultural Contribution to the World. Indian Cinema		
Total Lecture Hours		30 hours
Textbook:		
S.No	Book Title	Author
1.	Indian Art and Culture: for civil services and other competitive Examinations	Nitin Singhania
Reference Books:		
S.No	Book Title	Author
1.	The Wonder that was India (34th impression)	A. L. Basham

Self-Study Content Links:		Duration (in Hrs)
MOOCs	https://www.classcentral.com/course/swayam-indian-popular-culture-292678	24.00
	https://www.udemy.com/course/indian-history-chronology/	1.50
Video Lectures	https://youtu.be/xUphsn5b1w8?si=P8PqTnYUrNP3aWU7	1.00
	https://youtu.be/SeTjQHzLci0?si=E-DEaKnWJEPN8yHj	0.09
	https://youtu.be/32XmLQxwhlQ?si=Ew7hFEL12E_3rPkh	0.23
	https://youtu.be/iof_dTG4cnQ?si=QWhHFeacVcYZ7mmR	1.05
	https://youtu.be/xmtM0ilhBIU?si=w9MQv8HSdzBXD321	1.09
	https://youtu.be/7dT2eg3ekk0?si=YIDa9kfxJfTAyK11	1.26
	https://youtu.be/xhqP7rPGNu4?si=WxdcjHKqmD3HGWge	0.26
Web References	https://youtu.be/qE23vA4dHkk?si=6D9q-hKN57UVjUUV	0.33
	https://en.wikipedia.org/wiki/Indian_religions	



Course Code: DNC0102		Course Name: Constitution of India, Law And Engineering		L	T	P	C
Course Offered in: B.Tech- First Semester CSE/CSE-TWIN/IT/IT-TWIN/CS/CSE(DS)/ CSE(IOT)/CSE(AI)/AI-TWIN /CSE(AI ML)/CYS/ AI ML-TWIN/ECE/ECE(VLSI)/ME/M.Tech(Integrated)/BT				2	0	0	NC
Pre-requisite: Basic understanding of political science							
Course Objectives: Acquaint the students with legacies of constitutional development in India and help those to understand the most diversified legal document of India and philosophy behind it.							
Course Outcome: After completion of the course, the student will be able to				Bloom's Knowledge Level (KL)			
CO1	Identify and explore the basic features and modalities about Indian constitution.			K1			
CO2	Differentiate and relate the functioning of Indian parliamentary system at the center and state level			K2			
CO3	Differentiate different aspects of Indian Legal System and its related bodies.			K4			
CO4	Discover and apply different laws and regulations related to engineering practices.			K4			
CO5	Correlate role of engineers with different organizations and governance models.			K4			

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	1	1	2	1	1	3	2	2	1	2	1		
CO2	1	2	2	1	1	3	2	2	2	2	1		
CO3	1	2	2	1	1	3	2	3	1	2	1		
CO4	2	2	3	2	2	3	3	3	2	2	2		
CO5	2	2	3	2	1	3	2	3	2	3	2		

Unit 1	Introduction and Basic Information about Indian Constitution	6 hours
Meaning of the constitution law and constitutionalism, Historical Background of the Constituent Assembly, Government of India Act of 1935 and Indian Independence Act of 1947, Enforcement of the Constitution, Indian Constitution and its Salient Features, The Preamble of the Constitution, Fundamental Rights, Fundamental Duties, Directive Principles of State Policy, Parliamentary System, Federal System, Centre-State Relations, Amendment of the Constitutional Powers and Procedure, The historical perspectives of the constitutional amendments in India, Emergency Provisions: National Emergency, President Rule, Financial Emergency, and Local Self Government – Constitutional Scheme in India.		
Unit 2	Union Executive and State Executive	6 hours
Powers of Indian Parliament Functions of Rajya Sabha, Functions of Lok Sabha, Powers and Functions of the President, Comparison of powers of Indian President with the United States, Powers and Functions of Vice-President, Powers and Functions of the Prime Minister, Judiciary – The Independence of the Supreme Court, Appointment of Judges, Judicial Review, Public Interest Litigation, Judicial Activism, LokPal, Lok Ayukta, The Lokpal and Lok ayuktas Act 2013, State Executives – Powers and Functions of the Governor, Powers and Functions of the Chief Minister, Functions of State Cabinet, Functions of State Legislature, Functions of High Court and Subordinate Courts.		

Unit 3	Introduction and Basic Information about Legal System	6 hours
The Legal System: Sources of Law and the Court Structure: Enacted law -Acts of Parliament are of primary legislation, Common Law or Case law, Principles taken from decisions of judges constitute binding legal rules. The Court System in India and Foreign Courtiers (District Court, District Consumer Forum, Tribunals, High Courts, Supreme Court). Arbitration: As an alternative to resolving disputes in the normal courts, parties who are in dispute can agree that this will instead be referred to arbitration. Contract law, Tort, Law at workplace.		
Unit 4	Intellectual Property Laws and Regulation to Information	6 hours
Intellectual Property Laws: Introduction, Legal Aspects of Patents, Filing of Patent Applications, Rights from Patents, Infringement of Patents, Copyright and its Ownership, Infringement of Copyright, Civil Remedies for Infringement, Regulation to Information, Introduction, Right to Information Act, 2005, Information Technology Act, 2000, Electronic Governance, Secure Electronic Records and Digital Signatures, Digital Signature Certificates, Cyber Regulations Appellate Tribunal, Offences, Limitations of the Information Technology Act.		
Unit 5	Business Organizations and E-Governance	6 hours
Sole Traders, Partnerships: Companies: The Company's Act: Introduction, Formation of a Company, Memorandum of Association, Articles of Association, Prospectus, Shares, Directors, General Meetings and Proceedings, Auditor, Winding up. E-Governance and role of engineers in E-Governance, Need for reformed engineering serving at the Union and State level, Role of I.T. professionals in Judiciary, Problem of Alienation and Secessionism in few states creating hurdles in Industrial development.		
Total Lecture Hours		30 hours
Textbook:		
S.No	Book Title	Author
1.	Introduction to the Indian Constitution	Brij Kishore Sharma
Reference Books:		
S.No	Book Title	Author
1.	The Indian Constitution	Madhav Khosla

Self-Study Content Links:		Duration (in Hrs)
MOOCs	https://www.google.com/url?sa=i&source=web&ret=j&url=https://onlinecourses.nptel.ac.in/noc25_1w02/preview&ved=2ahUKEwjL_K6Lt8KVAxUo3TgGHdmhN3oQy_kOegoIAGgACAAIDxAJ&opi=89978449&cd&psig=AOvVaw3iygHhUeKYg3egnz62E-ST&ust=1783577767518000	10
Video Lectures	https://nptel.ac.in/courses/129106411?	10
Web References	https://www.legislative.gov.in/documents/constitution-of-india?	10

Course Code: DAS0201					Course Name: Biostatistics							L	T	P	C
Course Offered in: B.Tech- Second Semester BT												3	1	0	4
Pre-requisite: Knowledge of Mathematics up to 12 th standard															
Course Objectives:															
- Understand the basic concept / fundamentals of statistics. - Understand the importance of measures of Descriptive statistics and their implication in field of bio technology. - Understand the concept of random variables, probability distribution in field of bio technology. - Understand the concept of testing of hypothesis and apply Knowledge to analyze data. - Understand the concept of statistical quality control and apply Knowledge to create control charts.															
Course Outcome: After completion of the course, the student will be able to												Bloom’s Knowledge Level (KL)			
CO1	Understand the basic concept of fundamentals of statistics and its role descriptive analytics.											K2			
CO2	Understand the basic concept of Measures of central tendency and Skewness and kurtosis.											K2			
CO3	Apply the concept of random variables and probability distributions in field of bio technology.											K3			
CO4	Apply the concept of testing of hypothesis and analyze the data.											K3			
CO5	Apply the concept of statistical quality control to create control charts.											K3			
CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)															
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2		
CO1	3	2	2	2	1					2					
CO2	3	2	2	3	1			1	1	2	1				
CO3	3	2	1	2	-				1	2	1				
CO4	3	2	2	3	1	1		1	1	2	1				
CO5	2	2	2	3	1	1		1	1	2	1				
Course Contents / Syllabus															
Unit 1			Descriptive Statistics - I										09 hours		
Statistics: Definition, Importance & Limitation. Collection of data and formation of frequency distribution. Graphical presentation of frequency distribution – Bar Diagram, Histogram, Frequency curve, Frequency polygon, Ogive. Types of Sampling, Techniques of Sampling, Probability Sampling Techniques, Non-Probability Sampling, Determination of Sample Size.															
Unit 2			Descriptive Statistics - II										09 hours		
Measures of central tendency, Moments, Skewness and Kurtosis, Curve fitting for linear equation, nonlinear and multiple linear. Correlation, Rank Correlation and Regression analysis for linear, nonlinear and multiple linear.															
Unit 3			Random Variable and Probability Distributions										09 hours		
Random variables, Probability Distributions: Binomial, Poisson and Normal Distribution.															
Unit 4			Testing Of Hypothesis										09 hours		
Testing a Hypothesis, Null hypothesis, Alternative hypothesis, Level of significance, Confidence limits, Test of significance of Single and difference of means, Z-test, t-test and Chi-square test, F-test, ANOVA: One way.															
Unit 5			Statistical Techniques										09 hours		

Statistical Quality Control (SQC), Control Charts, Control Charts for variables (Mean and Range Charts), Control Charts for Variables (p, np and C charts).

Total Lecture Hours 45 hours

Textbook:

S.No	Book Title	Author
1	Statistical Methods, Sultan Chand & Sons	S.P. Gupta
2	Business Statistics, Pearson Education, New Delhi.	Sharma, J.K.,
3	Mathematical Statistics; S. Chand & Sons Company Limited, New Delhi.	J.N. Kapur
4	Higher Engineering Mathematics, Khanna Publisher.	B. S. Grewal

Reference Books:

S.No	Book Title	Author
1	Advanced Engineering Mathematics, 9 th Edition, John Wiley & Sons, 2006.	Erwin Kreyszig
2	Mathematics for Management, Tata McGraw Hill, 2004. Levin &	M. Raghava Chari
3	Statistics for Management, Prentice Hall.	David Rubin:
4	Quantitative Analysis for Management, Pearson Education.	Render, Barry, Stair, R.M., Hanna, M.E., & Badri
5	Quantitative Techniques in Management, McGraw Hill Education.	Vohra N.D.
6	Business Statistics and Applied Orientation, Pearson Education	Vishwanathan, P.K.

Self-Study Content Links:

		Duration (in Hrs)
MOOCs	https://nptel.ac.in/courses/102101056	20
Video Lectures	Unit 1	
	https://media.dev.nptel.ac.in/content/mp4/102/101/102101056/MP4/mod01lec02.mp4	29:24m
	https://media.dev.nptel.ac.in/content/mp4/102/101/102101056/MP4/mod01lec02.mp4	29:24m
	https://media.dev.nptel.ac.in/content/mp4/102/101/102101056/MP4/mod01lec03.mp4	27:49m
	https://media.dev.nptel.ac.in/content/mp4/102/101/102101056/MP4/mod01lec04.mp4	29:11m
	Unit 2	
	https://youtu.be/X48cZ6DGaSw?si=_KuWmOsFm2pJMcyb	13:55m
	https://youtu.be/m9a6rg0tNSM?si=qWyu1lyVe70OqfnT	17:33m
	https://youtu.be/Qy1YAKZDA7k?si=dILJzrHFCWeHX27F	14:57m
	https://youtu.be/JD4PNr5ez48?si=ELoy6UkCMMkrjTBJ	14:06m
	https://youtu.be/PWQsG0cU3Qc?si=4Fvo6QphitlukKdD	03:36m
	https://youtu.be/3lblehU7o-o?si=_E9BtCIwZF9Z8HaZ	11:01m
	https://youtu.be/qWxdAh_xz2k?si=OnA8S1ZQjAxvzxTt	11:37m
	https://youtu.be/uUEpQxiZp_M?si=w-yV7RIwzEKmBebh	25:13m
	Unit 3	
	https://www.youtube.com/watch?v=bpKarwfDRik	59:40m

	https://www.youtube.com/watch?si=yZt196CmB1EylUh_&v=EbxKvA0O9J4&feature=youtu.be https://www.youtube.com/watch?v=8MpgZJHcB8w https://www.youtube.com/watch?si=p8LJLStoJYwTrnAM&v=OZ_SA8H6JXU&feature=youtu.be	59:37m 46:44m
	Unit 4 https://youtu.be/dnDE96ERnMk?si=5nGTq77c1pHAqvyX https://youtu.be/xPAsqzOokd4?si=GOIMPcurpoJByH4N https://youtu.be/2hRb-HxIYMg?si=uZdtToBPOPANDg8P https://youtu.be/g9SJfZ-iqcI?si=0Dtj1DwFMq96vrfR https://youtu.be/BRR1_YdeV0c?si=chrHFRl5y1ijIHF6 https://youtu.be/JEz-gZ2vdU4?si=xIppYnGEIAZmtVu7 https://youtu.be/UoXLHfDPa88?si=atb-twPLrFafjD_c https://youtu.be/BE5sTsDleB4?si=r5-vr94ZjxMLv1Mi	33:34m 26:11m 26:24m 24:02m 28:30m 18:30m 21:22m 22:48m 22:45m
	Unit 5 https://youtu.be/T0S3D4e2Q4Y?si=pWSZIT8sSoKtfAyP https://www.youtube.com/watch?v=5GRuA5KEa3Y&list=PLTj8Y3qIWmgGR-gEE9zwx91L3JbI412Mr&index=2 https://youtu.be/-2dZC8mOyXs?si=usylK286ypOXSX_o https://youtu.be/ztH5KuW-1ds?si=mHN4gfsCvOn8ed0u https://youtu.be/70hQ63bWJco?si=r-1GB6j2HOL3BZoo https://youtu.be/bYS774Ld7Lk?si=Gik3zHfDJtNsuwnL https://youtu.be/KJ7-eIFkMg0?si=iivfAQy_qIj8aiRH	26:15m 11:49m 18:39m 13:25m 16:02m 26:19m 36:53m 26:41m
Web References		

Course Code: DCSIOT0202					Course Name: IoT in Lifesciences							L	T	P	C
Course Offered in: B.Tech- Second Semester BT												3	0	0	3
Pre-requisite: NA															
Course Objectives:															
1. To introduce the fundamental concepts, architecture, and interdisciplinary significance of the Internet of Things (IoT) in life sciences, including biotechnology, healthcare, agriculture, and environmental monitoring.															
2. To provide knowledge on various IoT devices and biosensors, including their design, implementation, and integration in biological systems for diagnostics, patient monitoring, and lab automation.															
3. To develop an understanding of data acquisition, storage, processing, and analysis techniques relevant to biological applications of IoT, including the use of cloud computing, machine learning, and data visualization.															
4. To explore practical applications of IoT in domains such as precision agriculture, remote healthcare, drug development, and environmental surveillance with real-world case studies.															
5. To sensitize learners to the challenges, ethical issues, and regulatory frameworks surrounding IoT implementation in life sciences, and encourage forward-thinking through future perspectives and innovations.															
Course Outcome: After completion of the course, the student will be able to												Bloom's Knowledge Level (KL)			
CO1	Recall and describe the fundamental architecture, components, and relevance of IoT in various life sciences domains including healthcare, agriculture, and environmental monitoring.											K1			
CO2	Explain the types and functions of sensors and IoT devices used in biological applications, including data acquisition techniques and microfluidic integrations.											K2			
CO3	Describe common techniques for data processing, cleaning, and transformation to ensure data quality and usability.											K1			
CO4	Explain the application of IoT technologies in smart agriculture, including crop monitoring, soil analysis, and efficient resource utilization.											K2			
CO5	Identify and explain the challenges, ethical issues, and future directions associated with IoT deployment in life sciences, focusing on security, privacy, and regulatory concerns.											K2			
CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)															
CO-PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	
CO1	3	2	2	-	-	2	-	-	-	-	2	3	3	2	
CO2	3	2	2	-	3	-	-	-	-	-	2	3	3	2	
CO3	3	3	2	2	3	-	-	-	-	1	3	3	3	3	
CO4	2	3	3	2	3	2	-	-	1	2	3	3	3	3	
CO5	2	2	2	-	2	3	3	-	-	-	2	3	3	2	
Course Contents / Syllabus															
Unit 1				Introduction to IoT and Its Relevance in Life Sciences								09 hours			
Definition and characteristics of IoT- IoT architecture: perception, network, and application layers- Role of IoT in biotechnology, healthcare, agriculture, and environmental monitoring- Case studies demonstrating IoT's impact on life sciences															
Unit 2				IoT Devices and Sensors in Biological Applications								09 hours			

Types of sensors used in life sciences (e.g., biosensors, environmental sensors)- Data acquisition methods for biological data- Design and application of wearable and implantable devices for patient monitoring and diagnostics- Integration of microfluidics and IoT in Lab-on-a-Chip systems

Unit 3	Data Management and Analytics in IoT-Enabled Life Sciences	09 hours
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Data storage solutions and cloud computing for IoT-generated data- Techniques for data processing, cleaning, and interpretation- Application of machine learning and AI for predictive analytics in life sciences- Tools and methods for effective data visualization.

Unit 4	Applications of IoT in Biotechnology and Healthcare	09 hours
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Implementation of IoT in smart agriculture: crop monitoring, soil analysis, resource optimization- Remote patient monitoring and personalized medicine and disease detection through IoT devices- Utilization of IoT in drug development, manufacturing, and supply chain management- Environmental monitoring using IoT for pollution levels, biodiversity, and ecosystem health

Unit 5	Challenges, Ethics, and Future Perspectives	09 hours
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Addressing security and privacy concerns in IoT networks- Understanding regulatory frameworks governing IoT in life sciences- Ethical considerations: data ownership, privacy, consent, and accessibility- Exploring future trends and emerging technologies in IoT applications within life sciences.

Total Lecture Hours	45 hours
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Textbook:

S.No	Book Title	Author
1	<i>Internet of Things: Principles and Paradigms</i> . Morgan Kaufmann, 2016.	R. Buyya and A. V. Dastjerdi
2	<i>Internet of Things in Biomedical Engineering</i> . Academic Press, 2020.	V. E. Balas, A. M. Grumezescu, and A. H. Alavi
3	<i>Internet of Things for Smart Agriculture: Technologies, Practices and Future Direction</i> . CRC Press, 2022.	P. Jaiswal, V. Kansal, and R. C. Poonia

Reference Books:

S.No	Book Title	Author
1	<i>Internet of Things: A Hands-On-Approach</i> . VPT, 2014.	A. Bahga and V. Madiseti
2	<i>Smart Biosensors in Medical Care</i> . Elsevier, 2022.	A. Mendez-Vilas, Ed.
3	<i>IoT and Analytics for Agriculture</i> . Springer, 2022.	S. D. Sawant, A. S. Mohite, and P. S. Shinde

Self-Study Content Links:

		Duration (in Hrs)
MOOCs	1. Internet of Things: Design Concepts and Use Cases By Prof. Maitreyee Dutta (SWAYAM) https://onlinecourses.swayam2.ac.in/e-learning/preview/ntr26_ed149	20 hrs

Video Lectures	Lecture 51 : IIoT Applications: Healthcare by NPTEL IIT Kharagpur https://www.youtube.com/watch?v=WmlgDL44PG4 IoT & Digital Twins Masters in Medical Entrepreneurship https://www.youtube.com/watch?v=VDc6CYy7AUE Internet of Medical Things Free Certified Bio Med Workshop Skill-Lync https://www.youtube.com/watch?v=-fWvk4Jfz6U	20 min 19 min 2.5 hours
Web References	Introduction to the Internet of Things and Embedded System https://www.coursera.org/learn/iot Introduction to IoT and Digital Transformation https://www.netacad.com/courses/introduction-iot?courseLang=en-US IoT Automation with Arduino IDE by ESP32 board--Part 1 https://www.udemy.com/course/iot-home-automation-arduino-esp32/	12 hrs 6 hrs 2 hrs

Course Code: DCSE0204				Course Name: Data analytics								L	T	P	C
Course Offered in: B.Tech- Second Semester BT												3	0	0	3
Pre-requisite: NA															
Course Objectives: 1. To introduce the basic concepts of data analytics and its applications in biotechnology. 2. To familiarize students with tools and techniques used to analyze biological datasets. 3. To develop skills for interpreting data using statistical methods and basic programming. 4. To provide hands-on experience using data analysis tools such as Excel, Python, or R.															
Course Outcome: After completion of the course, the student will be able to														Bloom's Knowledge Level (KL)	
CO1	Recall the stages of the data lifecycle and identify various data sources commonly found in life sciences.													K1,K2	
CO2	List basic data preprocessing techniques including handling missing values, duplicates, and data normalization methods.													K1	
CO3	Recall the types of data visualization tools such as bar charts, histograms, boxplots, and scatter plots used in biological data interpretation.													K1	
CO4	Explain the concept of data normalization and differentiate between normalization and standardization techniques used in biological data analysis.													K2	
CO5	Explain the significance and applications of bioinformatics databases and tools in the context of life science research.													K2	
CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)															
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	
CO1	3	2	-	-	2	-	-	1	2	-	3	2	-	3	
CO2	3	3	-	2	3	-	-	1	2	-	3	2	-	3	
CO3	3	3	2	3	3	-	-	-	1	-	3	2	-	3	
CO4	3	3	1	2	3	-	-	-	1	-	2	2	-	3	
CO5	3	3	2	3	3	-	-	1	2	2	3	2	-	3	
Course Contents / Syllabus															
Unit 1	Introduction to Data Analytics											09 hours			
Data Analytics Introduction, Types of data: Structured, Unstructured, Semi-structured, Role of data analytics in biotechnology, Overview of data lifecycle, Data sources in life sciences.															
Unit 2	Data Collection and Preprocessing											09 hours			
Data formats: CSV, Excel, FASTA, JSON, Data cleaning: handling missing values, duplicates, Data transformation and normalization, Basic exploratory data analysis (EDA).															
Unit 3	Descriptive Statistics and Data Visualization using different tools											09 hours			
Measures of central tendency (mean, median, mode), Measures of dispersion (range, variance, standard deviation), Correlation and covariance, Visualization tools: bar charts, histograms, boxplots, scatter plots, Introduction to data dashboards using Excel or Python (Matplotlib/Seaborn).															
Unit 4	Data Normalization and Transformation Techniques											09 hours			
Introduction to Data Normalization, Difference between normalization and standardization, Types of Normalization Techniques, Min-Max Normalization, Z-score Standardization, Log Transformation, Quantile Normalization, TPM/RPKM/FPKM (for gene expression data).															
Unit 5	Introduction to Biological Data Analysis Tools											09 hours			
Overview of bioinformatics databases and tools, Introduction to Python/R for data analysis, Working with biological sequences and expression data, Case study: Analyzing gene expression datasets from GEO.															
Total Lecture Hours												45 hours			

Textbook:		
S.No	Book Title	Author
1	Data Science for Beginners	Andrew Park
Reference Books:		
S.No	Book Title	Author
1	Bioinformatics Data Skills	Vince Buffalo
2	Statistics for Biologists	Campbell & Heyer
Self-Study Content Links:		Duration (in Hrs)
MOOCs	AI Artificial intelligence with python: https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01384279663126937623575_shared/overview	7h 21m
	Python Programming from Zero: https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_0138417951189401604327_shared/overview	8h 5m
	Comprehensive Data Analytics Bundle: https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01384786541716275255394_shared/overview	18h 53m
Video Lectures	Unit 1 https://www.youtube.com/watch?v=yZvFH7B6gKI&pp=ygUeSW50cm9kdWN0aW9uIHRvIERhdGEgQW5hbHI0aWNz	9m4s
	Unit 2 https://www.youtube.com/watch?v=tDu_KIIXaB0&pp=ygUhRGF0YSBDb2xsZWN0aW9uIGFuZCBQcmVwcm9jZXNzaW5n	5m52s
	Unit 3 https://www.youtube.com/watch?v=txNvZ3Zndak&pp=ygVERGVzY3JpcHRpdmUgU3RhZGlzdGljcyBhbmQgRGF0YSBWaXNlYWxpemF0aW9uIHVzaW5nIGRpbmVudCB0b29scyA%3D	14m42s
	Unit 4 https://www.youtube.com/watch?v=lggqjmQzsGI&pp=ygUwRGF0YSBOb3JtYWxpemF0aW9uIGFuZCBUcmFuc2ZvcmlhdGlviBUZWNobmlxdWVz	9m7s
	Unit 5 https://www.youtube.com/watch?v=VQcg8-Sd2eY&pp=ygUuSW50cm9kdWN0aW9uIHRvIEJpb2xvZ2ljYWwgRGF0YSBBbmFseXNpcyBUb29scw%3D%3D	14m12s
Web References	https://www.geeksforgeeks.org/data-analysis/data-analysis-tutorial/ https://unacademy.com/content/bpsc/study-material/science-and-technology/biotechnology/ https://www.geeksforgeeks.org/maths/descriptive-statistics/ https://www.geeksforgeeks.org/machine-learning/what-is-data-normalization/ https://www.geeksforgeeks.org/data-analysis/what-is-data-transformation/ https://www.longdom.org/articles/bioinformatics-understanding-biology-through-data-analysis-101912.html	10h



Course Code: DBT0201					Course Name: Fundamentals of Bio-Engineering							L	T	P	C
Course Offered in: B.Tech- Second Semester BT												2	0	0	2
Pre-requisite: Basic Biology, Physics, Chemistry, and Mathematics															
Course Objectives:															
1. To introduce the scope, significance, and interdisciplinary nature of bioengineering and its real-world applications.															
2. To apply basic engineering concepts like mass balance, transport phenomena, and thermodynamics to biological systems.															
3. To understand the properties, classification, and biocompatibility of biomaterials and the basics of biomechanics in biological tissues.															
4. To explore the principles and applications of bioinstrumentation and biosensors in diagnostics and monitoring.															
5. To introduce microbial kinetics, bioreactor basics, and fundamentals of metabolic and systems biology.															
Course Outcome: After completion of the course, the student will be able to												Bloom's Knowledge Level (KL)			
CO1	Define the concept of bioengineering and describe its interdisciplinary nature and applications in healthcare, agriculture, environment, and industry.											K1			
CO2	Recall fundamental engineering principles such as mass and energy balances, transport phenomena, and thermodynamics and explain their application in biological systems.											K1,K2			
CO3	Identify key concepts in biomechanics and describe stress-strain relationships in biological tissues along with their application in prosthetics and implants.											K1,K2			
CO4	Describe the basic components and working principles of bioinstrumentation and biosensors, and explain their applications in diagnostics and health monitoring.											K1,K2			
CO5	Recall the basics of bioprocess engineering and systems biology, and summarize the role of microbial growth kinetics, bioreactors, and computational modeling in biological research.											K1,K2			
CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)															
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	
CO1	2	2	2	1	-	3	3	3	2	2	1	2	1	-	
CO2	3	3	2	1	2	-	-	-	-	1	2	3	-	-	
CO3	3	3	3	2	2	2	1	-	2	2	1	2	3	-	
CO4	3	2	2	3	3	2	-	-	2	2	1	2	-	3	
CO5	3	2	2	3	2	2	2	-	-	1	1	3	3	3	
Course Contents / Syllabus															
Unit 1				Introduction to Bio-Engineering										06 hours	
Introduction to Bioengineering: Definition, scope and significance of bio-engineering, Historical development and modern trends, Interdisciplinary nature: biology, chemistry, physics, mathematics and engineering,															
Overview of applications: healthcare (diagnostics, therapeutics, prosthetics), agriculture (GMOs, biosensors), environment (bioremediation, waste treatment), and industry (biomanufacturing), Ethical, safety, and regulatory aspects of bioengineering innovations.															

Unit 2	Engineering Principles in Biology	06 hours
Engineering Principles in Biology: Mass and energy balances in biological systems, Transport phenomena (momentum, mass, heat) in cells and tissues, Fluid mechanics in circulation and organ systems, Application of thermodynamics in biological reactions, Modelling of simple biological systems: introduction to system equations and steady-state approximations.		
Unit 3	Biomechanics	06 hours
Biomechanics: Introduction to biomechanics: fundamental principles of biomechanics, stress-strain relationships in tissues, Applications in prosthetics and implants		
Unit 4	Bioinstrumentation and Biosensors	06 hours
Bioinstrumentation: Basics of bioinstrumentation, Transducers, signal acquisition and processing, Biosensors: Principles of biosensors: optical, electrochemical, piezoelectric, thermal, Performance parameters: sensitivity, specificity, response time, Applications in diagnostics and monitoring systems (glucose monitoring, pregnancy tests, wearable sensors, lab-on-a-chip systems).		
Unit 5	Bioprocess and Systems Biology	06 hours
Bioprocess and Systems Biology: Basics of microbial growth kinetics, Introduction to bioreactors and scale-up, Fundamentals of metabolic and systems biology, Computational modeling of biological networks.		
Total Lecture Hours		30 hours
Textbook:		
S.No	Book Title	Author
1	Bioengineering: Fundamentals, Pearson Education	Ann Saterbak, Ka-Yiu San, Larry V McIntire
2	Introduction to Biomedical Engineering, Elsevier	John Enderle & Joseph Bronzino
3	Biosensors: Fundamentals and Applications 1st ed. 1987; Oxford: Oxford University Press.	Anthony P.F. Turner, Isao Karube, G.S. Wilson
Reference Books:		
S.No	Book Title	Author
1	Bioprocess Engineering: Basic Concepts	Michael L. Shuler and Fikret Kargi
2	Biomedical Engineering Principles	Arthur T. Johnson
3	Handbook of Biosensors and Biochips 1st ed. 2007; Howard H. Weetall (Editors); Chichester, UK: Wiley	Robert S. Marks, David C. Cullen, Istvan Karube, Christopher R. Lowe
4	Bioinstrumentation 1st ed. 2004	John G. Webster; Hoboken, NJ: John Wiley & Sons
5	Relevant classic and recent research articles, review papers.	
Self-Study Content Links:		Duration (in Hrs)
MOOCs	Bioengineering: An Interface with Biology and Medicine (IIT Bombay, Prof. Sanjeeva Srivastava) NPTEL	8 weeks
	Cell Culture Technologies (IIT Kanpur)	8 Weeks
Video Lectures	https://openw.aprende.org/courses/biological-engineering/20-010j-introduction-to-bioengineering-be-010j-spring-2006/videos/Lecture-1-bioengineering/	2hrs

	https://openw.aprende.org/courses/biological-engineering/20-010j-introduction-to-bioengineering-be-010j-spring-2006/videos/lecture-2-biological-foundations-of-bioengineering/ https://openw.aprende.org/courses/biological-engineering/20-010j-introduction-to-bioengineering-be-010j-spring-2006/videos/lecture-4-biological-computing/	
Web References	https://www.youtube.com/results?search_query=NPTEL+Introduction+to+Bioengineering https://www.youtube.com/results?search_query=Introduction+to+Biological+Systems https://www.youtube.com/results?search_query=Cell+Structure+and+Organization+lecture Lesson 1: Intro to Thermodynamics Best Introduction to Thermodynamics Gibbs Free Energy https://www.youtube.com/results?search_query=Fluid+Mechanics+Biomedical+Engineering	



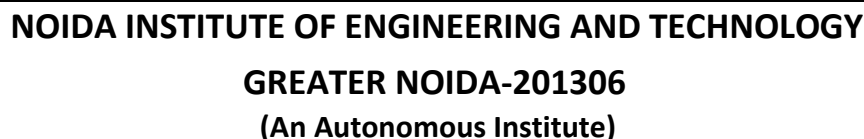
LAB Course Code: DCSIOT0252						LAB Course Name: IOT in Lifesciences Lab						L	T	P	C
Course Offered in: B.Tech- Second Semester BT												0	0	2	1
Pre-requisite: Basics of Science															
Course Objectives: To equip students with the knowledge and practical skills to design, implement, and analyze IoT-based systems tailored for life sciences applications, focusing on healthcare monitoring, environmental sensing, and bioprocess automation.															
Course Outcome: After completion of the course, the student will be able to												Bloom’s Knowledge Level (KL)			
CO1	Understand the basic concepts, architecture, and protocols of IoT and their relevance in life sciences.											K2			
CO2	Identify the steps involved in connecting and transmitting data from sensors (e.g., temperature, humidity, pH, TDS, heart rate) to cloud platforms such as ThingSpeak, Blynk, or Firebase.											K1,K2			
CO3	Describe the use of IoT and microcontroller-based systems in real-time monitoring applications such as soil moisture, water quality, and patient health tracking.											K1			
CO4	Explain the basics of data analytics and visualization using Python for interpreting sensor data and recognize key ethical and data security considerations in IoT-based healthcare systems.											K1,K2			
CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)															
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	
CO1	3	2	2	1	3	-	-	1	1	-	2	2	1	2	
CO2	3	3	3	2	3	2	-	1	1	1	2	3	2	3	
CO3	2	2	3	2	3	2	-	1	2	2	2	2	2	3	
CO4	2	3	2	3	3	2	-	1	2	1	3	2	2	3	
CO5	2	2	2	2	2	3	3	2	2	2	3	2	2	3	
List Of Practical’s (Indicative & Not Limited To)															
1. Describe Pinouts of Arduino and Node/MCU.															
2. Interfacing temperature and humidity sensor with Arduino/Node/MCU															
3. Sending Sensor Data to Cloud (Thing Speak/Blynk/Google Firebase)															
4. Biosensor Simulation: Heart Rate and Body Temperature Monitoring with Arduino/Node/MCU															
5. Interfacing IoT-Based Soil Moisture Monitoring System with Arduino/Node/MCU															
6. IoT-Based Water Quality Monitoring Using pH and TDS Sensors															
7. Patient Health Monitoring Dashboard using IoT and Mobile App (Blynk)															
8. Lab-on-a-Chip Simulation using Microfluidics + IoT (Demonstration/Simulation)															
9. Data Analytics and Visualization using Python (with CSV from IoT sensor logs)															
10. Ethical Considerations and Data Security in IoT Devices (Case Study-Based Practical)															

LAB Course Code: DCSE0254					LAB Course Name: Data Analytics Lab							L	T	P	C
Course Offered in: B.Tech- Second Semester BT												0	0	4	2
Pre-requisite: Basics of Science															
Course Objectives															
1. Gain hands-on experience in loading, cleaning, and transforming biological datasets. 2. Apply basic data analytics and statistical methods to interpret bioscience data. 3. Learn various data normalization and visualization techniques. 4. Perform exploratory data analysis and derive insights from biological data. 5. Develop the ability to use modern analytics tools such as Python or R for practical biological applications.															
Course Outcome: After completion of the course, the student will be able to													Bloom's Knowledge Level (KL)		
CO1	Recall common data formats such as FASTA, CSV, and Excel used for storing biological data and identify their basic structure and use cases.												K1, K2		
CO2	Describe the process of cleaning and normalizing gene expression data, including handling missing values and applying standardization techniques.												K1		
CO3	Explain basic statistical summaries and visualization techniques used to explore biological datasets, including bar plots, box plots, and scatter plots.												K2		
CO4	Recognize the significance of feature relationships in biological datasets and describe the basic idea behind clustering techniques like k-means in gene expression analysis.												K1		
CO5	Summarize the steps involved in completing a full data analytics cycle on biological datasets, from importing and cleaning data to performing analysis and visualization.												K2		
CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)															
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	
CO1	3	2	-	2	3	-	-	-	2	-	2	2	-	3	
CO2	3	3	-	3	3	-	-	-	2	-	2	2	-	3	
CO3	3	3	-	3	3	-	-	-	2	-	2	2	-	3	
CO4	3	2	-	2	3	-	-	-	2	-	2	2	-	3	
CO5	3	3	2	3	3	-	-	2	3	2	3	2	-	3	
List Of Practical's (Indicative & Not Limited To)															
1. Import a biological dataset (e.g., gene expression or assay data) and perform initial exploration.															
2. Clean a real-world gene expression dataset.															
3. Apply normalization techniques to biological data.															
4. Generate summary statistics for biological datasets.															
5. Visualize biological data using various plotting techniques.															
6. Read and analyze DNA/protein sequences in FASTA format.															



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|---|
| 7. Understand relationships between features in a dataset. |
| 8. Apply k-means clustering to categorize gene expression profiles. |
| 9. Create new features from existing biological attributes. |
| 10. Conduct a full data analytics cycle on a biological dataset. |



LAB Course Code: DCSE0252						LAB Course Name: Problem Solving using Python						L	T	P	C
Course Offered in: B.Tech- Second Semester CSE/CSE-TWIN/IT/IT-TWIN/CS/CSE(DS)/ CSE(IOT)/CSE(AI)/AI-TWIN /CSE(AIML)/CYS/ AIML-TWIN/ECE/ECE(VLSI)/ME/M.Tech(Integrated)/BT												0	0	6	3
Pre-requisite: Basic Computer Knowledge, Logical Thinking & Basic Mathematics															
Course Objectives: To provide Basic knowledge of Python programming and to implement programming skill for solving real world problems															
Course Outcome: After completion of the course, the student will be able to												Bloom’s Knowledge Level (KL)			
CO1	Apply basic Python constructs (variables, data types, control flow)											K2			
CO2	Develop modular programs using functions, recursion, and modules.											K4			
CO3	Use data structures, file operations, and exception handling in Python.											K5			
CO4	Implement object-oriented concepts											K4			
CO5	Build GUI applications using Tkinter and OOP techniques.											K3			
CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)															
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	
CO1	3	1	1	-	2	-	-	1	-	-	2				
CO2	3	2	2	1	2	-	-	1	-	-	2				
CO3	2	2	2	1	1	-	-	1	-	-	2				
CO4	3	3	2	1	2	-	-	1	-	-	2				
CO5	3	3	2	-	2	-	-	1	-	2	2				
Course Contents / Syllabus															
Unit 1		Introduction										14 hours			
Introduction: A Brief History of Python, Applications areas of python, Keywords and Identifiers, variables, data types and type conversion, Indexing and Slicing, operators in python, Operator precedence and associativity, Conditional Statements: if statement, if-else statement, Nested-if statement and elif statements. Loops: Purpose and working of loops, while loop, for loop, else with loop statement, Nested Loops, break, continue and pass statement.															
Unit 2		Function and Modules										15 hours			
Function: Built in function, user defined function, Function arguments, passing functions to a function, recursion, Lambda functions, Namespaces. Functional Programming: higher order functions, Map, filter, Reduce. Closures and its characteristics, Decorators, decorating function with argument and iterator, Modules and Packages: Importing Modules, writing own modules, Standard library modules, Packages in Python.															
Unit 3		Basic Data structures, Exception and File Handling										14 hours			
Python Basic Data Structures: Strings, Basic operations of strings, comparing strings, string formatting, Built-in string methods and function, Lists, Tuples, Sets and Dictionaries with built-in methods, List Comprehension. Exception Handling: Errors, Run Time Errors,															

Try-except statement, Raise, Assert. Files and Directories: Open a File, Reading and Writing data from files close a File, Read and Write operation.

Unit 4	Object Oriented Concepts	14 hours
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Object-oriented programming: User-defined classes, Object as an argument, Class variables and Instance variables, Constructor, Parameterized constructor, Encapsulation: Introduction, Data hiding, Instance methods, Class method, Static methods, property method, Magic Methods in python, Instances as Return Values.

Unit 5	Advanced Object-Oriented Techniques and GUI Programming	15 hours
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Introduction to inheritance, Types of inheritance, super () function, Abstract class, Polymorphism: Method overriding, Method Overloading. Tkinter: Creating a GUI Application, Widgets: Frame, Label, Button, Entry, Radio button, Check button, Canvas, and Menu.

Total Lecture Hours	72 hours
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Textbook:

S.No	Book Title	Author
1	"Beginning Python-From Novice to Professional"—Third Edition, Apress	Magnus Lie Hetland
2	Python Programming using Problem solving approach by OXFORD Higher education	Reema Thareja

Reference Books:

S.No	Book Title	Author
1.	Introduction to Computation and Programming Using Python “”, Revised and expanded Edition, MIT Press.	John V Guttag
2.	Introduction to Computer Science using Python: A Computational Problem-Solving Focus, Wiley India Edition.	Charles Dierbach
3.	“Think Python: How to Think Like a Computer Scientist”, 2nd edition, Updated for Python 3, Shroff/O’Reilly Publishers.	Allen B. Downey,
4.	Introduction to Programming in Python: An Inter- disciplinary Approach, Pearson India Education Services Pvt. Ltd.,2016.	Robert Sedgewick, Kevin Wayne, Robert Dondero:
5.	An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd.	Guido van Rossum and Fred L. Drake Jr,

Self-Study Content Links:

		Duration (in Hrs)
MOOCs	Unit 1: https://nptel.ac.in/courses/106106145 Unit 2: https://nptel.ac.in/courses/106106145 Unit 3: https://nptel.ac.in/courses/106106145 Unit 4: https://nptel.ac.in/courses/106106145 Unit 5: https://nptel.ac.in/courses/106106145	60hrs
Video Lectures	Unit 1: https://www.youtube.com/watch?v=PqFKRqpHrjw Unit 2: https://www.youtube.com/watch?v=oSPMmeaiQ68&t=2s Unit 3: https://www.youtube.com/watch?v=m9n2f9lhtrw https://www.youtube.com/watch?v=ixEeeNjjOJ0&t=4s https://www.youtube.com/watch?v=NMTEjQ8-AJM Unit 4: https://www.youtube.com/watch?v=JeznW_7DIB0	15m 39m 39m 31m 21m 53m

	Unit 5: https://www.youtube.com/watch?v=ibf5cx221hk	38m
Web References	1. https://www.python.org/ 2. https://www.w3schools.com/python/ 3. https://www.kaggle.com/learn/python	

List of Practical's

Sr. No	Program Title	CO Mapping
1	Print "Hello, World!" and perform basic arithmetic operations.	CO1
2	Display Python keywords and identifiers.	CO1
3	Program to demonstrate variable declaration and type conversion.	CO1
4	Demonstrate indexing and slicing on a list and string.	CO1
5	Use arithmetic, relational, and logical operators in a program.	CO1
6	Show operator precedence and associativity with example expressions.	CO1
7	Write a program using <code>if</code> and <code>if-else</code> conditions.	CO1
8	Implement nested <code>if</code> and <code>elif</code> statements to categorize age groups.	CO1
9	Write a program using a <code>while</code> loop to generate Fibonacci series.	CO1
10	Use a <code>for</code> loop to print the multiplication table of a number.	CO1
11	Create and call a user-defined function for factorial.	CO2
12	Write a function to compute GCD of two numbers using recursion.	CO2
13	Program with all types of function arguments (default, keyword, variable-length).	CO2
14	Use lambda function to sort a list of tuples by second element.	CO2
15	Implement higher-order functions: <code>map</code> , <code>filter</code> , and <code>reduce</code> .	CO2
16	Create a closure that captures the outer function's variable.	CO2
17	Write and use a simple decorator to log function execution.	CO2
18	Import and use built-in module <code>math</code> and <code>datetime</code> .	CO2
19	Create and import a user-defined module.	CO2
20	Create a package with multiple modules and use them in a script.	CO2
21	Perform basic operations on strings and demonstrate built-in string methods.	CO3
22	Compare strings and demonstrate different string formatting styles.	CO3
23	Create a list and demonstrate slicing, appending, and sorting.	CO3
24	Implement tuple packing and unpacking with basic operations.	CO3
25	Create a set, add/remove items, and perform set operations.	CO3
26	Create and manipulate a dictionary with nested structures.	CO3
27	Demonstrate list comprehension to generate a square number list.	CO3
28	Handle exceptions using <code>try-except-finally</code> blocks.	CO3
29	Raise custom exceptions with <code>raise</code> and validate input with <code>assert</code> .	CO3

30	Read a file line by line and count the frequency of each word.	CO3
31	Create a class with instance variables and methods.	CO4
32	Implement constructor and parameterized constructor in a class.	CO4
33	Show encapsulation using private attributes and getter/setter.	CO4
34	Demonstrate class method, static method, and property decorator.	CO4
35	Override <code>__str__</code> and <code>__len__</code> magic methods for a custom class.	CO4
36	Create and return class instances from another class.	CO4
37	Demonstrate single and multiple inheritance with method overriding.	CO4
38	Use <code>super()</code> to invoke parent methods from a subclass.	CO4
39	Create an abstract class and implement it in a derived class.	CO4
40	Show polymorphism with method overloading (via default args) and overriding.	CO4
41	Reuse inheritance examples and show hierarchical/multilevel inheritance.	CO5
42	Create a basic GUI window using Tkinter.	CO5
43	Add Labels, Buttons, and Entry fields to a GUI form.	CO5
44	Implement Radio buttons and Check buttons with event handling.	CO5
45	Personal Expense Tracker: A Python app to record and categorize daily expenses for better budgeting.	CO5
46	Library Management System: A GUI-based tool to manage book issue, return, and inventory for small libraries.	CO5
47	Weather Forecast App: A real-time weather dashboard using API to display city-wise conditions.	CO5
48	Quiz Application: An interactive Python quiz system with scoring and question randomization.	CO5
49	File Organizer: A desktop utility to auto-sort files into folders based on their extensions.	CO5
50	Personal Expense Tracker: A Python app to record and categorize daily expenses for better budgeting.	CO5



Course Code: DASL0202					Course Name: French Language							L	T	P	C
Course Offered in: B.Tech- Second Semester BT												2	0	0	2
Pre-requisite: Basic understanding of the English language.															
Course Objectives:															
1. To help students learn to articulate in French language in day-to-day real-life situations.															
2. To enable students acquire and develop the four fundamental language skills-Listening, Speaking, Reading, and Writing (LSRW).															
Course Outcome: After completion of the course, the student will be able to												Bloom's Knowledge Level (KL)			
CO1	Identify and recall basic elements of the French language, including greetings, simple vocabulary, and expressions related to identity.											K1			
CO2	Recall and reproduce common phrases used for self-introduction and basic everyday communication in French.											K1			
CO3	Explain and use simple French expressions to ask questions and navigate everyday situations such as directions and locations.											K2			
CO4	Describe routine activities and personal preferences using basic French vocabulary and sentence structures.											K2			
CO5	Apply appropriate French language structures to describe people, family relationships, and personal interests in simple conversational contexts.											K3			
CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)															
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2		
CO1	-	1	1	-	-	-	-	-	-	2	-	-	-		
CO2	-	1	-	-	-	1	-	-	1	3	-	-	-		
CO3	-	2	-	-	-	2	-	-	2	3	-	-	-		
CO4	-	-	-	-	-	2	-	-	2	3	-	-	-		
CO5	-	-	-	-	-	3	1	2	2	3	-	-	-		
Course Contents / Syllabus															
Unit 1			Basics of French language and Identity										6 hours		
• Culture & Civilization • Salutations (formal and informal) • Alphabets and Accents • Numbers • Definite articles • Vocabulary: Countries and Nationalities; Professions • Filling a registration Form/ ID card															
Unit 2			Introducing Oneself and Everyday Communication										6 hours		
• Subject pronouns; Use of ‘tu’ and ‘vous’ • Verbs: Être and Avoir • Possessive Adjectives • Introduction (1st person, 3rd person) • Give and take Personal Information • Indefinite Articles															

- Days of the Week, Months of the Year
- Vocabulary: Daily Life Objects
- Talk about Likes and Dislikes (Aimer, Adorer, Détester, Préférer + Noun/ Verb)
- Negation (ne...pas)

Unit 3	Navigating the City and Asking Questions	6 hours
• Vocabulary: Places in a city • Prepositions • Contracted Articles • Vocabulary: Modes of Transports • Verbs: Prendre, Descendre, Aller • Talk about one's city • Interrogation (close-ended); Interrogation (open-ended) • Directions; Time • Invitation to a Place: Acceptance & Refusal		
Unit 4	Talking About Activities and Preferences	6 hours
• Talk about activities, places, weather, etc • Verbs: Venir, Faire • Vocabulary: Professions, Sports and Cultural Activities • Verbs: Faire, Aller + Contracted Articles + Activities		
Unit 5	Describing People, Family, and Interests	6 hours
• Qualitative Adjectives • Talk about interests and hobbies • Vocabulary: Family • Talk about a family		
Total Lecture Hours		30 hours
Text Book :		
S.No	Book Title	Author
1.	Alter Ego	Annie Berthet, Catherine Hugot, Véronique M. Kizirian, Emmanuelle Daill
Reference Books :		
S.No	Book Title	Author
1.	Edito 1 (Méthode de français/Cahiers d'exercices)	Lucie Mensdorff-Pouilly, Caroline Spérandio, Roxane Amoravain (et al.)
2.	Saison A1 (Méthode de français/Cahier d'exercices)	Marie-Noëlle Cocton, Delphine Ripaud, Anne-Laure Kieffer

Self-Study Content Links:		Duration (in Hrs)
MOOCs	https://www.udemy.com/share/103BEs3@_JNcFDcpMjZHwIefu_aoNEGRrOgcZH0W8oJB_366JGb1_4wajJLW7WoGRRe8j_JAwcg==/ https://www.udemy.com/share/101CD03@1rBLasBniB-WwikfO2XBbfgg050QZagfzpo6TEiBkSqIajUNMDfKsE9MSQCiAeELDg==/ https://www.coursera.org/learn/french-beginner#modules	10hrs

Video Lectures	https://www.youtube.com/playlist?list=PL8zIR8aXkW8E2RNQbZvLdprSzhvgBfmax https://apprendre.tv5monde.com/fr/exercices/premiere-classe	6hrs
Web References	https://www.ccubeacademy.com/french-grammar-quiz/ https://www.ccubeacademy.com/numbers-in-french-0-to-100/ https://archive.org/details/AlterEgo1.CahierDactivites/page/n11/mode/2up https://www.scribd.com/document/647857104/Edito-A1-Nouvelle-Edition-Cahier#page=15	4hrs



Pre-requisite: No prior knowledge of German language is required; willingness to learn a foreign language is encouraged.

- To develop basic proficiency in listening, speaking, reading and writing through structured beginner-levels tasks.
- To enable students to use basic German expressions effectively in familiar personal and social contexts.

[illegible]

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

Course Contents / Syllabus

• Learning Objectives

- Greetings and farewells (Grüßen und Verabschieden)
- Spelling words and alphabet
- Self-introduction and introducing others (Sich und andere vorstellen)
- Asking about well-being (Nach dem Befinden fragen)
- Numbers 1-20 (Zahlen bis 20)
- Phone numbers and email addresses (Telefonnummer und E-Mail-Adresse)

- W-questions (W-Fragen)
- Statement sentences (Aussagesätze)

- Verbs (regelmäßige Verben) and personal pronouns (Personalpronomen in Texten)
- Countries and languages

Skill Focus (LSRW):

- **Listening:** Understanding greetings, introductions and short exchanges involving personal information, numbers and contact details through guided audio input.
- **Speaking:** Self-introduction, spelling practice, and simple question–answer interactions using basic personal information.
- **Reading:** Reading short introductory dialogues and simple texts related to personal information and everyday interactions.
- **Writing:** Writing basic self-introductions and completing simple personal information forms.

Unit 2	Personal Interest and Social Interaction (Hobbies, Professions and Everyday Interaction)	5 hours
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• **Learning Objectives:**

- Describing hobbies and free time activities
- Talking about professions and work
- Using numbers and time expressions
- Plural forms of nouns
- Zahlen ab 20 (Numbers 20 onwards)

Grammar Topics:

- Unregelmäßige Verben (Irregular Verbs) und Personalpronomen
- Verben haben und sein
- Definite articles (der, die, das)
- Plural formation and endings
- Numbers and working hours
- Ja/Nein Fragen (Yes/NO questions)

Skill Focus (LSRW):

- **Listening:** Understanding short conversations related to hobbies, professions, numbers and simple time-related expressions.
- **Speaking:** Pair practice on introducing interests, talking about professions, asking and answering simple questions, and exchanging information about schedules and working hours.
- **Reading:** Reading short dialogues and simple texts related to work, hobbies and everyday activities.
- **Writing:** Constructing simple sentences and guided descriptive writing using basic vocabulary, numbers and time expressions.

Unit 3	Everyday Functional Communication (City Life, Directions and Orientation)	6 hours
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• **Learning Objectives:**

- Describing cities and famous buildings
- Giving directions and talking about transportation
- Months and seasons
- Cultural sites and events

Grammar Topics:

- Indefinite articles (ein, eine)
- Negation with "nicht und kein"
- Imperativ mit Sie
- Adjektive mit sein(verb)

- Transportation vocabulary
- Prepositions for directions (links, rechts, geradeaus)

Skill Focus (LSRW):

- **Listening:** Understanding short conversations related to directions, transportation, time expressions (months and seasons) and place-related information.
- **Speaking:** Guided speaking practice for asking and giving directions, describing locations and places, and using polite imperative forms in simple interactions.
- **Reading:** Reading short notices, maps, signs and simple dialogues related to places, travel and cultural activities.
- **Writing:** Writing simple descriptions of places and short responses related to directions, travel and basic situational contexts.

Unit 4	Situational Interaction Skills (Food, Shopping and Daily Life Communication)	6 hours
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Learning Objectives:

- Food and drink vocabulary
- Shopping for groceries
- Ordering in restaurants
- Talking about taste and preferences
- Daily eating habits and mealtimes

Grammar Topics:

- Accusative case
- Verbs with Akkusativ
- Articles in accusative case
- Food-related Verbs (essen, trinken, kosten, schmecken)
- Verben (mögen und möchten)
- Quantities and measurements

Skill Focus (LSRW):

- **Listening:** Understanding short conversations related to food, ordering in restaurants and simple shopping situations.
- **Speaking:** Guided speaking practice for ordering food, expressing preferences using mögen/möchten, and interacting in simple shopping situations.
- **Reading:** Reading short menus, price lists and simple dialogues related to food and shopping.
- **Writing:** Writing simple sentences and short messages describing food preferences, meal habits and basic shopping interactions.

Unit 5	Everyday Life (Family, Time and Routine Activities)	6 hours
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Learning Objectives:

- Daily routines and schedules
- Family relationships
- Telling time (official and unofficial)
- Making telephonic appointments
- Expressing necessity and possibility by using Modal verbs

Grammar Topics:

- Time Expression and telling time
- Time Expression: am, um, von.....bis
- Modal verbs (können, müssen, wollen)
- Possessive pronouns (mein, dein, sein, ihr) (Nominativ und Akkusativ)

Skill Focus (LSRW):

- **Listening:** Understanding short conversations related to daily routines, family interactions, time expressions and telephonic appointments.
- **Speaking:** Guided conversational practice describing daily activities, family members, telling time, and making simple appointments using modal verbs.
- **Reading:** Reading short texts and dialogues related to routines, schedules, appointments and family life.
- **Writing:** Writing simple sentences, short messages and brief paragraphs describing daily routines, time schedules and basic personal situations.

Total Lecture Hours 30 hours

Textbook:

S.No	Book Title	Author
1.	Netzwerk Neu A1	Klett Sprachen

Reference Books:

S.No	Book Title	Author
1.	Studio D A1 (Cornelsen Verlag GmbH & Co.)	Hermann Funk, Christina Kuhn, Silke Demme
2.	Langescheidt Dictionary	

Self-Study Content Links:

Self-Study Content Links:		Duration (in Hrs)
MOOCs	Alison – Beginner German 101 and 102 - Beginner German 101 Alison and Beginner German 102 Alison NOC: German - I, IIT Madras - German - I SWAYAM -IIT MADRAS VHS A1 Learn Deutsch - A1-Deutschkurs - A1-Deutschkurs DW Learn Deutsch – Harry gefangen in der Zeit – A1 DW Learn Deutsch – Nicos Weg A1- A1-Nicos Weg DW	10
Video Lectures	Goethe Institut - Deutsch für dich Goethe Institut - Goethe-Zertifikat A1: Start Deutsch 1 – Prüfungsteil Hören mit Lösungen Official Deutsche Welle Deutsch lernen mit der DW - Officiall	6
Web References	Klett Netzwerk Neu A1 - Deutsch als Fremdsprache Klett Sprachen Netzwerk Neu A1- Netzwerk neu - Start - Ernst Klett Sprachen GmbH Netzwerk A1 Interaktives Übungsbuch- Netzwerk neu A1.1 Digital book VHS Lernportal - A1 Strat vhs-Lernportal Goethe Institut - Deutsch Üben- Goethe-Institut	4

Course Code: DASL0204					Course Name: Japanese							L	T	P	C
Course Offered in: B.Tech- Second Semester BT												2	0	0	2
Pre-requisite: NA															
Course Objectives: 1. To help the students learn to articulate in Japanese language in day-to-day real-life situations. 2. To enable the students acquire the four basic skills LSRW (Listening, Speaking, Reading, and Writing) of language learning.															
Course Outcome: After completion of the course, the student will be able to												Bloom’s Knowledge Level (KL)			
CO1	Understand and be familiar with basic Japanese Language concepts and the culture.											K1			
CO2	Recognise the fundamental vocabulary.											K1			
CO3	Use simple vocabulary and sentences in everyday conversations.											K3			
CO4	Read and write simple sentences.											K2			
CO5	Use complex sentences and develop basic writing skills.											K3			
CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)															
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2		
CO1	-	1	1	-	-	-	1	1	2	3	1	-	-		
CO2	-	1	1	-	-	-	1	1	2	3	2	-	-		
CO3	-	2	2	1	-	1	1	1	2	3	2	-	-		
CO4	-	2	2	1	-	1	1	1	3	3	2	-	-		
CO5	-	2	2	1	-	1	1	1	3	3	2	-	-		
Course Contents / Syllabus															
Unit 1			Introduction to Japanese										6 hours		
General features of Japanese, Japanese scripts, Pronunciation of Japanese words, Classroom instructions, Daily greetings and expressions, Numerals, Months name Days of the week, Time & Calendar, Family members, Vocabulary lessons 1&2, Sentence pattern & Example sentences, Self-introduction (jikosho kai)															
Unit 2			Vocabulary building										6 hours		
Country, language, and people, Basic conversations, Vocabulary lessons 3&4, Use of patterns (KO, SO, AA, and DO), Conversations between guests and hosts, Conversations between customers and shopkeepers															
Unit 3			Everyday common simple sentences										6 hours		
Vocabulary lessons 5&6, Grammar explanation, Colour & taste, Conversations in post office, Conversations with friends, Making a request, Making an enquiry – Railway Station, Buying Fruits & Vegetables, Names of the Animals, Question formation.															
Unit 4			Reading and Writing										6 hours		
Scanning based Newspaper reading, Transportation, KANJI Form of Writing – 40 Characters, Shopping Counters, Basic Japanese grammar rules – particles: か (ka), は (wa),, の (no), と (to), を (o), に (ni), も (mo), が (ga), や (ya),, Kara, Soshite, Grammar - Present, Past, Future, Adjectives, Vocabulary Lessons 7&8															
Unit 5			Skilled Writing										6 hours		



NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY
GREATER NOIDA-201306
(An Autonomous Institute)

Write short text on oneself., Grammar: Pronouns – subject, object, possessive, Modal verbs

Total Lecture Hours 30 Hours

Textbook:

S.No	Book Title	Author
1.	Minna no nihongo – N5	3A Corporation

Self-Study Content Links:

		Duration (in Hrs)
MOOCs	https://nptel.ac.in/courses/121104005 https://nptel.ac.in/courses/121104005 https://www.coursera.org/learn/japanese-language-1 https://www.udemy.com/course/japanese-n5-course/ https://alison.com/course/japanese-language-introduction-to-japanese-scripts https://alison.com/course/japanese-for-beginners	10hrs
Video Lectures	https://youtu.be/c069yRMdPyY?si=nFtcvhjgx-kHCC6m https://youtu.be/RrCkS2PEL7I?si=zYC4RBIgWsiGDjQK https://youtu.be/3iSXUpA0wzY?si=VfE2YbAJVYgAX7Uv http://youtu.be/ArOfXbCC-WE?si=Jojvv_EXCuykl27F https://youtu.be/xCTI2rPN_BE?si=Zz40L7xE5UOT2XZK https://youtu.be/EDCbKMNaIVc?si=5YcpD-rTFNAWsXnX https://youtu.be/jcGWIWgOmWw?si=bY-NPf6B61UvuNOW https://youtu.be/3nIKTbSsjvg?si=RS15u5NYDghDxYzM	6hrs
Web References	https://www.marugoto-online.jp/info/jp/sp/index.html#mainContents https://www.hikidasu.jpf.go.jp/en/corner/drama/	4hrs

LAB Course Code: DASL0251				LAB Course Name: Communication for Career Enhancement					L	T	P	C
Course Offered in: B.Tech- Second Semester CSE/CSE-TWIN/IT/IT-TWIN/CS/CSE(DS)/ CSE(IOT)/CSE(AI)/AI-TWIN /CSE(AIML)/CYS/ AIML-TWIN/ECE/ECE(VLSI)/ME/M.Tech(Integrated)/BT									0	0	4	2
Pre-requisite: The students should have completed ABC course in semester I												
Course Objectives:												
1. To improve proficiency in Business English to the upper-intermediate level of CEFR (Common European Framework of Reference). 2. To improve professional communication skills.												
Course Outcome: After completion of the course, the students will be able to												
S. No		Course Outcome							Bloom’s Knowledge Level (KL)			
CO1		Apply key concepts of soft skills in real life scenarios.							K3			
CO2		Understand conversations and discussions on a variety of topics.							K2			
CO3		Express ideas clearly and effectively through oral communication.							K3			
CO4		Understand and analyse main ideas of complex texts.							K4			
CO5		Construct clear and detailed texts on a wide range of topics.							K6			
CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)												
CO-PO Mapping		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1		1	1	1	1	1	1	1	1	2	3	1
CO2		1	1	1	1	1	1	1	1	2	3	1
CO3		1	1	1	1	1	1	1	1	2	3	1
CO4		1	2	2	2	2	2	1	1	2	3	1
CO5		1	1	2	2	2	2	1	1	2	3	1
List of Practical												
1. Introduction To the course Anubhav Activity On score improvement												
2. Listening to a variety of accents in English The students will develop their ability to comprehend English conversations with diverse speakers.												
3. Vocabulary Games The students will enhance their vocabulary through various interesting exercises and word-games.												
4. Role Play The students will practice how to meet, greet, and converse in miscellaneous professional scenarios.												
5. Deciphering the main points and summarizing The students will develop the ability to grasp the main point and summarize lengthy documents												
6.. Writing professional emails The students will practice and develop ability to write clear and concise emails.												
7. Critiquing Films/Videos The students will improve their listening and critical thinking skills, and will revise rules of reported speech.												
8. News Reports												

The students will practice speaking with correct pronunciation and intonation.
9. Time Bound Case Study Analysis The students will learn to focus and analyze assigned content
10. Essay Writing The students will practice writing essays on the domain specific topics with emphasis on corrective grammar (as per the need).
11. Presentations based on the Essay The students will learn to organize the content logically and present their ideas coherently.
12. Vocabulary Enhancement Exercise The students will acquire domain specific terms.
13. Listen and Repeat (Emphasis on accepted Accent, Rhythm, Intonation) Read out loud (Emphasis on pauses)
14. Passage Writing Based on Pictures The students will write passages on pictures and will discuss correct grammatical structures based on the passages.
15. Peer Talk on specific topics of general interest The students will develop conversational skills by discussing topics in pairs and will record their response to general questions asked by their peers.
16. Responding to general questions (Ref: ES Test) The students will develop the ability to respond spontaneously to general questions.
17. Identifying Errors The students will learn to identify & rectify structural errors.
18. Solving Para-Jumbles The students will learn to organize ideas in a passage
19. Language Toolbox The students will do exercises on Active & Passive Voices and cloze tests.
20. Goal setting & Self discovery The students will set their short-term & long-term goals and will explore adjectives that best describe themselves.
21. Extempore speeches The students will hone their spontaneous public speaking skills.
22. Group Discussions The students will improve their ability to express their views clearly while discussing a topic in a group.
23. Role Play Activity The students will perform role plays on campus behaviour, language, and dress sense of students.
24. Anubhav Activity The students will reflect on the semester and the road map ahead.

Total Hours: 60 hrs.

Self-Study Content Links:		Duration (in Hrs)
MOOCs	Listening: https://www.youtube.com/watch?v=Snve4Y8dMno https://www.youtube.com/watch?v=d27bn5k9Mjw&t=101s	37m 1 hr
	Speaking: https://www.youtube.com/watch?v=pImF1JkpAjo&list=PLLy_2iUCG87Dz7sxcJrCV2xbjw-x46g7w&index=7 https://www.youtube.com/watch?v=STVxfk_relw&list=PLp02GGDX5DIoMkblgrYhq91rF7_JZsf4-&index=25	39m 35m
	Reading: https://www.youtube.com/watch?v=2h1Oaifi8mw&list=PLzf4HHIsQFwIDV-HfgMEYY7f5Jw6FmxrK&index=3	39m

	https://www.youtube.com/watch?v=jJUXEcMR6Ys&list=PLzJaFd3A7DZtnTdtOxvjO3GLPd1WVe6oq&index=6 Writing: https://www.youtube.com/watch?v=RASpQtZI06E&list=PLLy_2iUCG87AuIWZ3qnjA1GriD-IGF3Za&index=9 https://www.youtube.com/watch?v=ekFRWnPV6lc&t=535s	36m 33m 1hr
Video Lectures	Listening: https://www.youtube.com/watch?v=Ra6L83XwLko https://www.youtube.com/watch?v=Qa0G_7RJ2go Speaking: https://www.youtube.com/watch?v=HAnw168huqA https://www.youtube.com/watch?v=F4Zu5ZZAG7I Reading: https://www.youtube.com/watch?v=Zm8CuJGLuXU https://www.youtube.com/watch?v=FMD-rHth3_g Writing: https://www.youtube.com/watch?v=gFXE9n7hrOI https://www.youtube.com/watch?v=o9aVjBHEEbU	34m 37m 58m 15m 15m 41m 24m 14m
Web References	Listening: https://www.researchgate.net/publication/394276570_Developing_Listening_Comprehension_Using_Podcasts_in_Second_Language_Education_A_Systematic_Overview_of_Recent_Pedagogical_Innovations_2019-2025 https://www.tandfonline.com/doi/full/10.1080/10904018.2013.813234#d1e729 Speaking: https://files.eric.ed.gov/fulltext/EJ1460111.pdf https://www.jetir.org/papers/JETIR2410126.pdf Reading: https://ijrpr.com/uploads/V6ISSUE2/IJRPR38781.pdf https://files.eric.ed.gov/fulltext/EJ1332254.pdf Writing: https://www.sciencedirect.com/science/article/pii/S2405844024129076 https://files.eric.ed.gov/fulltext/EJ1329510.pdf	

Course Code: DMB0201	Course Name: Innovation and Entrepreneurship	L	T	P	C
Course Offered in: B.Tech- Second Semester BT		2	0	0	2

Pre-requisite:

Course Objectives: This course is designed to ignite the innovative and entrepreneurial spirit within students by providing them with a foundational understanding of how ideas are transformed into impactful ventures. Students will learn to identify and define different types of innovation, employ creative problem-solving techniques, and grasp the core principles of entrepreneurship and the entrepreneurial mindset.

Course Outcome: After completion of the course, the student will be able to

Bloom's Knowledge Level (KL)

CO1	Explain the core concepts of innovation, the innovation process, and the fundamentals of entrepreneurship.	K2
CO2	Apply techniques for idea generation, opportunity recognition, and validation for potential tech-driven ventures.	K3
CO3	Develop a basic business model and value proposition for an innovative idea, and understand the principles of MVP development.	K6.
CO4	Describe the basics of Intellectual Property Rights relevant to technology and the foundational elements of startup finance and team building.	K2
CO5	Formulate and present a concise pitch for a startup concept and describe the components of the entrepreneurial ecosystem.	K6

CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	2	-	1	1	1	1	-	2	1	2		
CO2	2	2	2	2	2	2	2	1	1	2	2		
CO3	3	1	2	3	2	2	1	1	1	1	1		
CO4	1	2	1	2	1	-	1	-	-	1	2		
CO5	2	1	1	1	1	1	-	1	2	2	1		

Course Contents / Syllabus

Unit 1	Introduction to Innovation	6 hours
Defining Innovation, Types (Product, Process, Service, Business Model), Importance in Technology, Disruptive vs. Sustaining vs. Incremental Innovation. Idea Generation Techniques (Brainstorming, SCAMPER), Design Thinking Overview, Problem Identification & Definition, Creative Problem Solving.		
Unit 2	Entrepreneurship Development	6 hours
Defining Entrepreneurship, Entrepreneurial Mindset & Traits, Types of Entrepreneurs (Tech, Social), Myths, Role in Economic Development. Identifying Market Needs & Gaps, Sources of Ideas, Evaluating Ideas (SWOT, PESTLE basics), Basic Market Research, Customer Discovery Introduction.		
Unit 3	Developing a Minimum Viable Product (MVP)	6 hours

Business Model Canvas (BMC) / Lean Canvas, Defining a Compelling Value Proposition, Understanding Target Customers, Basic Competitive Analysis. Concept of MVP for tech products/services, Prototyping (Lo-fi, Hi-fi), Importance of User Feedback, Lean Startup Principles (Briefly).

Unit 4	Intellectual Property Rights (IPR)	6 hours
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Basics of Patents (for inventions), Copyrights (for software/content), Trademarks (for brands), Trade Secrets. Importance for tech startups. Building a Founding Team, Bootstrapping, Sources of Early-Stage Funding (Angels, VCs - Conceptual), Basic Financial Terms (Revenue, Cost, Profit).

Unit 5	The Entrepreneurial Ecosystem	6 hours
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Go-to-Market Strategies (Basics), Elements of a Good Pitch, developing a Pitch Deck, Practicing the Elevator Pitch. Role of Incubators, Accelerators, Government Support Schemes, Networking. Challenges & Opportunities. Future of Tech Entrepreneurship.

Total Lecture Hours	30 hours
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Textbook:

S.No	Book Title	Author
1.	Entrepreneurship and Innovation: Theory, Practice and Context	Tim Mazzaro, Sophie Reboud
2.	Innovation and Entrepreneurship	Peter F. Drucker

Reference Books:

S.No.	Book Title	Author
1.	Entrepreneurship - New Venture Creation, Pearson Publications	David H Holt

Self-Study Content Links:	Duration (in Hrs)
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MOOCs	https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01384297087666585628430_shared/overview	06
	https://www.coursera.org/learn/innovative-ideas?specialization=business-entrepreneurship	05
Video Lectures	https://www.youtube.com/watch?v=UEngvxZ11sw https://www.youtube.com/watch?v=A6BktbsRPr4	03
Web References		
PBL	Capstone Project	16

Course Code: DNC0202				Course Name: Constitution of India, Law And Engineering								L	T	P	C
Course Offered in: B.Tech- Second Semester CSE/CSE-TWIN/IT/IT-TWIN/CS/CSE(DS)/ CSE(IOT)/CSE(AI)/AI-TWIN /CSE(AIML)/CYS/ AIML-TWIN/ECE/ECE(VLSI)/ME/M.Tech(Integrated)/BT												2	0	0	NC
Pre-requisite: Basic understanding of political science															
Course Objectives: Acquaint the students with legacies of constitutional development in India and help those to understand the most diversified legal document of India and philosophy behind it.															
Course Outcome: After completion of the course, the student will be able to												Bloom’s Knowledge Level (KL)			
CO1	Identify and explore the basic features and modalities about Indian constitution.											K1			
CO2	Differentiate and relate the functioning of Indian parliamentary system at the center and state level											K2			
CO3	Differentiate different aspects of Indian Legal System and its related bodies.											K4			
CO4	Discover and apply different laws and regulations related to engineering practices.											K4			
CO5	Correlate role of engineers with different organizations and governance models.											K4			
CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)															
CO-PO Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2		
CO1	1	1	2	1	1	3	2	2	1	2	1				
CO2	1	2	2	1	1	3	2	2	2	2	1				
CO3	1	2	2	1	1	3	2	3	1	2	1				
CO4	2	2	3	2	2	3	3	3	2	2	2				
CO5	2	2	3	2	1	3	2	3	2	3	2				
Course Contents / Syllabus															
Unit 1				Introduction and Basic Information about Indian Constitution								6 hours			
Meaning of the constitution law and constitutionalism, Historical Background of the Constituent Assembly, Government of India Act of 1935 and Indian Independence Act of 1947,Enforcement of the Constitution, Indian Constitution and its Salient Features, The Preamble of the Constitution, Fundamental Rights, Fundamental Duties, Directive Principles of State Policy, Parliamentary System, Federal System, Centre-State Relations, Amendment of the Constitutional Powers and Procedure, The historical perspectives of the constitutional amendments in India, Emergency Provisions: National Emergency, President Rule, Financial Emergency, and Local Self Government – Constitutional Scheme in India.															
Unit 2				Union Executive and State Executive								6 hours			
Powers of Indian Parliament Functions of Rajya Sabha, Functions of Lok Sabha, Powers and Functions of the President, Comparison of powers of Indian President with the United States, Powers and Functions of Vice-President, Powers and Functions of the Prime Minister, Judiciary – The Independence of the Supreme Court, Appointment of Judges, Judicial Review, Public Interest Litigation, Judicial Activism, LokPal, Lok Ayukta, The Lokpal and Lok ayuktas Act 2013, State Executives – Powers and Functions of the Governor, Powers and Functions of the Chief Minister, Functions of State Cabinet, Functions of State Legislature, Functions of High Court and Subordinate Courts.															
Unit 3				Introduction and Basic Information about Legal System								6 hours			

The Legal System: Sources of Law and the Court Structure: Enacted law -Acts of Parliament are of primary legislation, Common Law or Case law, Principles taken from decisions of judges constitute binding legal rules. The Court System in India and Foreign Courtiers (District Court, District Consumer Forum, Tribunals, High Courts, Supreme Court). Arbitration: As an alternative to resolving disputes in the normal courts, parties who are in dispute can agree that this will instead be referred to arbitration. Contract law, Tort, Law at workplace.

Unit 4	Intellectual Property Laws and Regulation to Information	6 hours
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Intellectual Property Laws: Introduction, Legal Aspects of Patents, Filing of Patent Applications, Rights from Patents, Infringement of Patents, Copyright and its Ownership, Infringement of Copyright, Civil Remedies for Infringement, Regulation to Information, Introduction, Right to Information Act, 2005, Information Technology Act, 2000, Electronic Governance, Secure Electronic Records and Digital Signatures, Digital Signature Certificates, Cyber Regulations Appellate Tribunal, Offences, Limitations of the Information Technology Act.

Unit 5	Business Organizations and E-Governance	6 hours
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Sole Traders, Partnerships: Companies: The Company's Act: Introduction, Formation of a Company, Memorandum of Association, Articles of Association, Prospectus, Shares, Directors, General Meetings and Proceedings, Auditor, Winding up. E-Governance and role of engineers in E-Governance, Need for reformed engineering serving at the Union and State level, Role of I.T. professionals in Judiciary, Problem of Alienation and Secessionism in few states creating hurdles in Industrial development.

Total Lecture Hours 30 hours

Textbook:

S.No	Book Title	Author
1.	Introduction to the Indian Constitution	Brij Kishore Sharma

Reference Books:

S.No	Book Title	Author
1.	The Indian Constitution	Madhav Khosla

Self-Study Content Links:	Duration (in Hrs)
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MOOCs	https://www.google.com/url?sa=i&source=web&rct=j&url=https://onlinecourses.nptel.ac.in/noc25_lw02/preview&ved=2ahUKEwjL_K6Lt8KVAxUo3TgGHdmhN3oQy_kOegoIAGgACAAIDxAJ&opi=89978449&cd&psig=AOvVaw3iygHhUeKYg3egnz62E-ST&ust=1783577767518000	10
Video Lectures	https://nptel.ac.in/courses/129106411?	10
Web References	https://www.legislative.gov.in/documents/constitution-of-india?	10



CO-PO Mapping (Scale 1: Low, 2: Medium, 3: High)

Course Contents / Syllabus

Unit 1	Society State and Polity in India	6 hours
State in Ancient India: Evolutionary Theory, Force Theory, Mystical Theory Contract Theory, Stages of State Formation in Ancient India, Kingship , Council of Ministers Administration Political Ideals in Ancient India Conditions’ of the Welfare of Societies, The Seven Limbs of the State, Society in Ancient India, Purusārtha, Varnāshrama System, Āshrama or the Stages of Life, Marriage, Understanding Gender as a social category, The representation of Women in Historical traditions, Challenges faced by Women.		
Unit 2	Indian Literature, Culture, Tradition, and Practice	6 hours
Evolution of script and languages in India: Harappan Script and Brahmi Script. The Vedas, the Upanishads, the Ramayana and the Mahabharata, Puranas, Buddhist And Jain Literature in Pali,Prakrit And Sanskrit, Sikh Literature, Kautilya’s Arthashastra, Famous Sanskrit Authors, Telugu Literature, Kannada Literature,Malayalam Literature ,Sangama Literature Northern Indian Languages & Literature, Persian And Urdu ,Hindi Literature.		

Unit 3	Indian Religion, Philosophy, and Practices	6 hours
Pre-Vedic and Vedic Religion, Buddhism, Jainism, Six System Indian Philosophy, Shankaracharya, Various Philosophical Doctrines , Other Heterodox Sects, Bhakti Movement, Sufi movement, Socio religious reform movement of 19th century, Modern religious practices.		
Unit 4	Science, Management and Indian Knowledge System	6 hours
Astronomy in India, Chemistry in India, Mathematics in India, Physics in India, Agriculture in India, Medicine in India , Metallurgy in India, Geography, Biology, Harappan Technologies, Water Management in India, Textile Technology in India ,Writing Technology in India Pyrotechnics in India Trade in Ancient India/,India's Dominance up to Pre-colonial Times.		
Unit 5	Cultural Heritage and Performing Arts	6 hours
Indian Architect, Engineering and Architecture in Ancient India, Sculptures, Pottery, Painting, Indian Handicraft, UNESCO'S List of World Heritage sites in India, Seals, coins, Puppetry, Dance, Music, Theatre, drama, Martial Arts Traditions, Fairs and Festivals, UNESCO'S List of Intangible Cultural Heritage, Calenders, Current developments in Arts and Cultural, Indian's Cultural Contribution to the World. Indian Cinema		
Total Lecture Hours		30 hours
Textbook:		
S.No	Book Title	Author
1.	Indian Art and Culture: for civil services and other competitive Examinations	Nitin Singhania
Reference Books:		
S.No	Book Title	Author
1.	The Wonder that was India (34th impression)	B. L. Basham
Self-Study Content Links:		Duration (in Hrs)
MOOCs	https://www.classcentral.com/course/swayam-indian-popular-culture-292678	24.00
	https://www.udemy.com/course/indian-history-chronology/	1.50
Video Lectures	https://youtu.be/xUphsn5b1w8?si=P8PqTnYUrNP3aWU7	1.00
	https://youtu.be/SeTjQHzLci0?si=E-DEaKnWJEPN8yHj	0.09
	https://youtu.be/32XmLQxwhlQ?si=Ew7hFEL12E_3rPkh	0.23
	https://youtu.be/iof_dTG4cnQ?si=QWhHFeacVcYZ7mmR	1.05
	https://youtu.be/xmtM0ilhBIU?si=w9MQv8HSdzBXD321	1.09
	https://youtu.be/7dT2eg3ekk0?si=YIDa9kfxJfTAyK1l	1.26
	https://youtu.be/xhqP7rPGNu4?si=WxdcjHKqmD3HGWge	0.26
	https://youtu.be/qE23vA4dHkk?si=6D9q-hKN57UVjUUV	0.33
Web References	https://en.wikipedia.org/wiki/Indian_religions	