KIT - Kalaignarkarunanidhi Institute of Technology

(An Autonomous Institution)

Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai
Accredited by NAAC with 'A' GRADE & NBA (BIOTECH, CSE, ECE, EEE & MECH)
An ISO 9001 : 2015 Certified Institution

Coimbatore - 641 402.

CURRICULUM & SYLLABUS - 2025

(For Students admitted from the Academic Year 2025-26 and onwards)

I & II Semester

Bachelor of Technology in Biotechnology

Department of Biotechnology

Vision and Mission of the Department

Vision

+	To offer quality education and research in the field of Biotechnology and to foster technologically competent and socially responsible professionals.

Mission

+	To provide outcome based competent education in Biotechnology towards the career aspirations of students by advanced laboratories and value added programmes.
+	To collaborate with industries and premier institutions to make the students competitive and industry ready professionals.
+	To cultivate research outlook, entrepreneurial attributes, interpersonal skills, moral values and societal commitments among students.

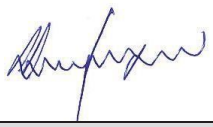
Program Educational Objectives (PEO's)

PEO 1	Graduates will be successful professionals in industry, skilled researchers, or globally competitive entrepreneurs.
PEO 2	Graduates will possess critical thinking skills to solve problems in Biotechnology and allied fields.
PEO 3	Graduates will demonstrate a lifelong commitment to learning in their professional careers.

Program Outcomes (PO's)

After the successful completion of the U.G. Program in Biotechnology, graduates will be able to:

PO 1	**Engineering Knowledge:** Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.
PO 2	**Problem Analysis:** Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)
PO 3	**Design / Development of Solutions:** Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)
PO 4	**Conduct Investigations of Complex Problems:** Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8)
PO 5	**Engineering Tool Usage:** Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)



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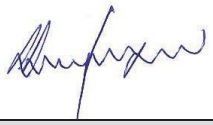
PO 6	**The Engineer and The World:** Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7)
PO 7	**Ethics:** Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)
PO 8	**Individual and Collaborative Team work:** Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.
PO 9	**Communication:** Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences
PO 10	**Project Management and Finance:** Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.
PO 11	**Life-Long Learning:** Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8)

Program Specific Outcome (PSO's)	
After the successful completion of the U.G. Program in Biotechnology, graduates will be able to :	
PSO 1	Identify and solve emerging problems in Biotechnology and allied fields.
PSO 2	Support fundamental and translational research in applied and interdisciplinary Biotechnology.



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Curriculum and Scheme of Assessment
(For Students admitted from the Academic Year 2025-26 and onwards)

Semester I

Course Code	Course Name	Category	Teaching and Learning Scheme					Credit	Assessment		
			CI		LI	TW+ SL	Total no. of Hours per semester		CIA	ESE	Total
			L	T	P	SL					
B25MCT101	Induction Program	MC	-	-	-	-		NC	-	-	-
B25ENI101	Communicative English	HS	60	0	30	30	120	4	50	50	100
B25MAT101	Matrices and Differential Calculus	BS	60	15	0	45	120	4	40	60	100
B25PCI101	Physical Sciences	BS	60	0	30	30	120	4	50	50	100
B25CSI101	C Programming	ES	45	0	15	30	90	3	50	50	100
B25MET101	Engineering Graphics	ES	60	15	0	45	120	4	40	60	100
B25HST101	Heritage of Tamil	HS	15	0	0	15	30	1	100	-	100
B25MEP101	Engineering Practices Laboratory	ES	0	0	15	15	30	1	60	40	100
B25MCT102	Universal Human Values #	MC	15	0	0	15	30	1	100	-	100
Total			315	30	90	225	660	21			

Semester II

Course Code	Course Name	Category	Teaching and Learning Scheme					Credit	Assessment		
			CI		LI	TW+ SL	Total no. of Hours per semester		CIA	ESE	Total
			L	T	P	SL					
B25HST20x	Language Studies	HS	30	0	0	30	60	2	40	60	100
B25MAT201	Integral Calculus and Complex Analysis	BS	60	15	0	45	120	4	40	60	100
B25CSI202	Problem Solving using Python Programming	ES	60	0	30	30	120	4	50	50	100
B25CBI102	Application Design and Development	ES	30	0	30	30	90	3	50	50	100
B25BTT201	Bioorganic chemistry	PC	45	0	0	45	90	3	40	60	100
B25BTT202	Cell Biology and Genetics	PC	45	0	0	45	90	3	40	60	100
B25HST201	Tamils and Technology	HS	15	0	0	15	30	1	100	-	100
B25BTP201	Cell Biology Laboratory	PC	0	0	45	15	60	2	60	40	100
B25CEP101	Design Thinking	ES	0	0	15	15	30	1	100	-	100
B25MCT201	Holistic insight into UN SDGs#	MC	0	0	15	15	30	1	100	-	100
B25MCT202	Professional Development Course I #	MC	0	0	15	15	30	1	100	-	100
Total			285	15	150	300	750	23			

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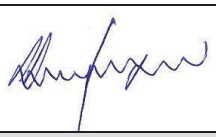
UHV, SDG, PDC I. The Grades earned by the students will be recorded in the marksheet, however the same shall not be considered for the computation of CGPA.

Semester III											
Course Code	Course Name	Category	Teaching and Learning Scheme						Assessment		
			CI		LI	TW+ SL	Total no. of Hours per semester	Credit	CIA	ESE	Total
			L	T	P	SL					
B25MAT301	Partial Differential Equations and Probability	**BS**	60	15	0	45	**120**	**4**	40	60	100
B25BTT301	Biochemistry	**PC**	45	0	0	45	**90**	**3**	40	60	100
B25BTT302	Stoichiometry and Fluid Mechanics	**PC**	60	15	0	45	**120**	**4**	40	60	100
B25BTT303	Biochemical Thermodynamics	**PC**	45	0	0	45	**90**	**3**	40	60	100
B25BTT304	Microbiology	**PC**	45	0	0	45	**90**	**3**	40	60	100
B25BTT305	Industrial Biotechnology	**PC**	45	0	0	45	**90**	**3**	40	60	100
B25BTP301	Biochemistry and Bioorganic Chemistry Laboratory	**PC**	0	0	45	15	**60**	**2**	60	40	100
B25BTP302	Microbiology Laboratory	**PC**	0	0	45	15	**60**	**2**	60	40	100
-	Soft Skill	**CEC**	0	0	30	0	**30**	**1**	100	-	100
-	Concept for Practices I	**CEC**	0	0	15	15	**30**	**NC**	-	-	-
-	Mandatory Course I	**MC**	0	0	15	15	**30**	**NC**	-	-	-
-	Inplant Training	**CEC**	-	-	-	-	**-**	**NC**	-	-	-
Total			**300**	**30**	**150**	**330**	**810**	**25**			

Semester IV											
Course Code	Course Name	Category	Teaching and Learning Scheme						Assessment		
			CI		LI	TW+ SL	Total no. of Hours per semester	Credit	CIA	ESE	Total
			L	T	P	SL					
B25MAT401	Biostatistics	**BS**	60	15	0	45	**120**	**4**	40	60	100
B25BTT401	Molecular Biology	**PC**	45	0	0	45	**90**	**3**	40	60	100
B25BTT402	Unit Operations in Biotechnology	**PC**	45	0	0	45	**90**	**3**	40	60	100
B25BTT403	Enzymology and Enzyme Technology	**PC**	45	0	0	45	**90**	**3**	40	60	100
B25BTT404	Bioprocess Principles	**PC**	60	15	0	45	**120**	**4**	40	60	100
B25BTT405	Analytical Methods in Biotechnology	**PC**	45	0	0	45	**90**	**3**	40	60	100
B25BTP401	Analytical Methods in Biotechnology Laboratory	**PC**	0	0	45	15	**60**	**2**	60	40	100
B25BTP402	Chemical Engineering Laboratory	**PC**	0	0	45	15	**60**	**2**	60	40	100



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-	Concept for Practices II	CEC	0	0	15	15	30	NC	-	-	-
-	Mandatory Course II	MC	0	0	15	15	30	NC	-	-	-
-	Professional Development Course II#	MC	0	0	0	0	0	1	-	-	-
Total			300	30	120	330	780	24			

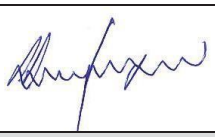
#Externship – THREE WEEKS (Review will be conducted in first week of SEM V and its credit will be included in SEM V mark statement),
#PDC II. The Grades earned by the students will be recorded in the marksheet, however the same shall not be considered for the computation of CGPA.

Semester V

Course Code	Course Name	Category	Teaching and Learning Scheme					Credit	Assessment		
			CI		LI	TW+ SL	Total no. of Hours per semester		CIA	ESE	Total
			L	T	P	SL					
B25BTT501	Mass Transfer Operations	PC	45	0	0	45	90	3	40	60	100
B25BTT503	Genetic Engineering	PC	45	0	0	45	90	3	40	60	100
B25BTT504	Protein Engineering	PC	45	0	0	45	90	3	40	60	100
B25BTE50x	Professional Elective I	PE	45	0	0	45	90	3	40	60	100
-	Open Elective I	OE	45	0	0	45	90	3	40	60	100
-	IoT - Theory with practical cum project		60	0	30	30	120	4	40	60	100
B25BTP501	Bioprocess Laboratory	PC	0	0	45	15	60	2	60	40	100
B25BTP502	Molecular Biology and Genetic Engineering Laboratory	PC	0	0	45	15	60	2	60	40	100
-	Concept for Practices III	CEC	0	0	15	15	30	NC	-	-	-
-	Cyber Safety Essential	CEC	0	0	15	15	30	NC	-	-	-
-	Mandatory Course III	MC	0	0	15	15	30	NC	-	-	-
-	Externship #	CEC	-	-	-	-	-	NC	-	-	-
Total			285	0	165	330	780	23			

Semester VI

Course Code	Course Name	Category	Teaching and Learning Scheme					Credit	Assessment		
			CI		LI	TW+ SL	Total no. of Hours per semester		CIA	ESE	Total
			L	T	P	SL					
B25BTT601	Bioinformatics	PC	45	0	0	45	90	3	40	60	100
B25BTT602	Chemical Reaction Engineering	PC	45	0	0	45	90	3	40	60	100
B25BTT603	Immunology	PC	45	0	0	45	90	3	40	60	100
B25BTT604	Bioprocess Engineering	PC	45	0	0	45	90	3	40	60	100
B25BTE60x	Professional Elective II	PE	45	0	0	45	90	3	40	60	100



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-	Open Elective II	**OE**	**45**	0	0	45	**90**	**3**	40	60	100
B25BTP601	Bioinformatics Laboratory	**PC**	**0**	0	45	15	**60**	**2**	60	40	100
B25BTP602	Immunology Laboratory	**PC**	**0**	0	45	15	**60**	**2**	60	40	100
-	Concept for Practices IV	**CEC**	**0**	0	15	15	**30**	**NC**	-	-	-
-	Mandatory Course IV	**MC**	**0**	0	15	15	**30**	**NC**	-	-	-
-	NCC Credit Course Level3 #	**-**	**0**	0	30	0	**30**	**1**	100	-	100
Total			**270**	**0**	**150**	**330**	**750**	**22**			

#NCC Credit Course Level3 (is offered for NCC students only). The Grades earned by the students will be recorded in the marksheet, however the same shall not be considered for the computation of CGPA.

Semester VII

Course Code	Course Name	Category	Teaching and Learning Scheme						Assessment		
			CI		LI	TW+ SL	Total no. of Hours per semester	Credit	CIA	ESE	Total
			L	T	P	SL					
B25BTT701	Downstream Processing	**PC**	45	0	0	45	**90**	**3**	40	60	100
B25BTT702	Biopharmaceutical Technology	**PC**	45	0	0	45	**90**	**3**	40	60	100
B25BTT702	Nanobiotechnology	**PC**	45	0	0	45	**90**	**3**	40	60	100
B23BTE70x	Professional Elective III	**PE**	45	0	0	45	**90**	**3**	40	60	100
B25BTE70x	Professional Elective IV	**PE**	45	0	0	45	**90**	**3**	40	60	100
B25BTP701	Downstream Processing Laboratory	**PC**	0	0	45	15	**60**	**2**	60	40	100
B25BTP702	Project Phase I	**PW**	0	0	90	30	**120**	**4**	40	60	100
Total			**225**	**0**	**135**	**270**	**630**	**21**			

Semester VIII

Course Code	Course Name	Category	Teaching and Learning Scheme						Assessment		
			CI		LI	TW+ SL	Total no. of Hours per semester	Credit	CIA	ESE	Total
			L	T	P	SL					
B25BTP801	Project Phase II	PW	0	0	**180**	**60**	**240**	**8**	40	60	100
Total			**0**	**0**	**180**	**60**	**240**	**8**			

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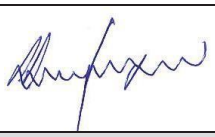
Professional Elective – I											
Course Code	Course Name	Category	Teaching and Learning Scheme						Assessment		
			CI		LI	TW+ SL	Total no. of Hours per semester	Credit	CIA	ESE	Total
			L	T	P	SL					
B25BTE501	Biophysics	**PE**	45	0	0	45	**90**	**3**	40	60	100
B25BTE502	Biosensors	**PE**	45	0	0	45	**90**	**3**	40	60	100
B25BTE503	Disaster Management	**PE**	45	0	0	45	**90**	**3**	40	60	100
B25BTE504	Principles of Food Preservation	**PE**	45	0	0	45	**90**	**3**	40	60	100

Professional Elective – II											
Course Code	Course Name	Category	Teaching and Learning Scheme						Assessment		
			CI		LI	TW+ SL	Total no. of Hours per semester	Credit	CIA	ESE	Total
			L	T	P	SL					
B25BTE601	Bioprocess Plant Design and Economics	**PE**	45	0	0	45	**90**	**3**	40	60	100
B25BTE601	Marine Biotechnology	**PE**	45	0	0	45	**90**	**3**	40	60	100
B25BTE601	Metabolic Engineering	**PE**	45	0	0	45	**90**	**3**	40	60	100
B25BTE601	Phytochemicals and Herbal Medicine	**PE**	45	0	0	45	**90**	**3**	40	60	100

Professional Elective – III											
Course Code	Course Name	Category	Teaching and Learning Scheme						Assessment		
			CI		LI	TW+ SL	Total no. of Hours per semester	Credit	CIA	ESE	Total
			L	T	P	SL					
B25BTE701	Biofuels	**PE**	45	0	0	45	**90**	**3**	40	60	100
B25BTE702	Environmental Biotechnology	**PE**	45	0	0	45	**90**	**3**	40	60	100
B25BTE703	Forensic Biotechnology	**PE**	45	0	0	45	**90**	**3**	40	60	100
B25BTE704	Tissue Engineering and Biomaterials	**PE**	45	0	0	45	**90**	**3**	40	60	100



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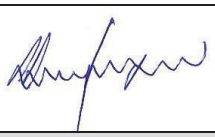
Professional Elective – IV											
Course Code	Course Name	Category	Teaching and Learning Scheme					Credit	Assessment		
			CI		LI	TW+ SL	Total no. of Hours per semester		CIA	ESE	Total
			L	T	P	SL					
B25BTE705	Cancer Biology	**PE**	45	0	0	45	**90**	**3**	40	60	100
B25BTE706	Molecular Pathogenesis and Disease Diagnostics	**PE**	45	0	0	45	**90**	**3**	40	60	100
B25BTE707	Stem Cell Technology	**PE**	45	0	0	45	**90**	**3**	40	60	100
B25BTE708	Vaccine Technology	**PE**	45	0	0	45	**90**	**3**	40	60	100



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SYLLABUS

SEMESTER-I

B.E / B.Tech	B25ENI101 – COMMUNICATIVE ENGLISH (Common to ALL)	L	T	P	TW +SL / SL	Total Hours	C
		60	0	30	30	120	4

Course Objectives	
1.	To enhance listening and reading ability of learners to comprehend various forms of speech or conversations.
2.	To help learners' develop vocabulary through reading skills.
3.	To make use of grammatical knowledge to enhance writing skills.
4.	To foster learners' ability to write convincing job applications and effective reports.
5.	To develop learners language proficiency through LSRW skills.

SYLLABUS:

UNIT - I		12
Vocabulary Development: Understanding contextual meaning, Synonyms Language Development: Parts of Speech Reading: Reading to find information - Effectively scanning text for key facts Listening: Listening to speeches/talks and making a critical review on them Writing: Creative Writing - Writing brief paragraphs - Note making - Summarizing- Paraphrasing Speaking: Enhancing Pronunciation Skills, Self- Introduction, Introducing a friend		

UNIT - II		12
Vocabulary Development: Phrasal verbs, one word substitutes, Transitional devices Language Development: Regular & Irregular verbs, Tenses Reading: Reading for basic comprehension - cloze passages - Skimming for main ideas - Scanning for specifics Listening: Listen to lectures & advertisements about products Writing: Interpretations & Transcoding (Pie Chart, Bar Diagram, Flow chart, Tables), Writing Advertisement & Writing captions Speaking: Participating in formal & informal conversations, narrating events & experiences		

UNIT - III		12
Vocabulary Development: Types of phrases, clauses and sentences - Sentence patterns Language Development: Phrases describing certainty/uncertainty; adjectives with prefixes- Connectives - Comparative forms Reading: Techniques of correct understanding of a text- Vocabulary in context - Noun and pronoun usage Listening: Listening commentaries and announcements Writing: Writing essays – types of essays Speaking: Short speech (Just A Minute) - Extempore and persuasive speech		

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UNIT - IV		12
Vocabulary Development: Word puzzles, Numerical adjectives Language Development: Question tag and conditional sentences Reading**:** Extensive reading and Intensive reading - Unfamiliar words in a passage and guess the meaning from the context Listening: Listening to TED Talks, Educational videos and completing exercises based on them Writing: Email writing, Email etiquettes, Job application and Resume preparation Speaking: speaking about online communication & Types - Advantages and disadvantages of online communication - Acceptable online roles and behaviours		

UNIT - V		12
Vocabulary Development: Collocations, verbal analogies Language Development: Voices, Direct and Indirect questions, Spelling and Punctuation, Modal verbs Reading: Reading and understanding technical articles, Short comprehension passages Listening: Listening to interviews, Mock Interviews Writing: Report Writing - Proposal writing Speaking: Picture description, discussing and making plans - talking about tasks & its progress		

List of Experiments:

Expt. No.	Description of the Experiments
1.	Self-Introduction
2.	Reading comprehension
3.	Extempore
4.	Listening Comprehension
5.	Proposal writing
	Total Hours: (60+30+30) = 120

List of Equipment's:

Requirements for a Batch of 60 Students		
Sl. No.	**Description of the Equipment**	**Quantity required (Nos.)**
1.	Oral talk software	60 Nos
2.	System	60 Nos
3.	Headphone	60 Nos

Approved by BoS Chairman

Text Books	
1.	Board of Editors. Fluency in English A Course book for Engineering and Technology. Orient Blackswan, Hyderabad: 2016
2.	Sudharshana.N.P and Saveetha. C. English for Technical Communication. Cambridge University Press: New Delhi, 2016.

Reference Books	
1.	Dutt P.Kiranmai and Rajeevan Geeta, "Basic Communication Skills", Foundation Books, 2013.
2.	Kumar, Suresh. E. "Engineering English" Orient Blackswan: Hyderabad, 2015
3.	Booth-L. Diana, Project Work, Oxford University Press, Oxford: 2014.
4.	Davis, Jason and Rhonda LIss. Effective Academic Writing (Level 3) Oxford University Press: Oxford, 2006
5.	Grammar F. Margot and Colin S. Ward Reading and Writing (Level 3) Oxford University Press: Oxford, 2011

Mooc/SWAYAM/NPTEL/Course Era/ Web Resources:	
1.	https://onlinecourses.swayam2.ac.in/ntr25_ed62/preview
2.	https://onlinecourses.swayam2.ac.in/cec25_hs31/preview?
3.	https://www.coursera.org/specializations/business-english
4.	https://www.coursera.org/specializations/leadership-communication-engineers

Course Outcomes: Students will be able to	
CO1	Develop listening skills to respond appropriately in general and academic purposes. (K3)
CO2	Develop strategies and skills to enhance their ability to read and comprehend. (K3)
CO3	Apply vocabulary skills to improve their language skills. (K3)
CO4	Build the writing skills with specific reference to technical writing. (K3)
CO5	Demonstrate language proficiency through LSRW skills. (K2)

Approved by BoS Chairman

For Credit: 4 (Integrated Course)

<table>
<tr><th colspan="8">Evaluation Pattern:</th></tr>
<tr><th colspan="6">Continuous Internal Assessment</th><th colspan="2">End Semester Examinations</th></tr>
<tr><td colspan="2">CIA I (Theory)
(100 Marks)</td><td colspan="2">CIA II (Theory)
(100 Marks)</td><td colspan="2">(Practical)
(100 Marks)</td><td rowspan="2">Theory End Semester Examinations (Examinations will be conducted for 100 Marks)</td><td rowspan="2">Practical End Semester Examinations (Examinations will be conducted for 100 Marks)</td></tr>
<tr><td>* Alternate Assessment Tool (AAT)</td><td>Written Test</td><td>* Alternate Assessment Tool (AAT)</td><td>Written Test</td><td>* Evaluation of Laboratory experiment, results & Record</td><td>Test (Model)</td></tr>
<tr><td>40 Marks</td><td>60 Marks</td><td>40 Marks</td><td>60 Marks</td><td>75 Marks</td><td>25 Marks</td><td>35 Marks</td><td>15 Marks</td></tr>
<tr><td colspan="4">25 Marks</td><td colspan="2">25 Marks</td><td colspan="2">50 Marks</td></tr>
<tr><td colspan="6">50 Marks</td><td colspan="2">50 Marks</td></tr>
<tr><td colspan="8">Total: 100 Marks</td></tr>
</table>

***** AAT - Individual Assignment/ Case Study/ Seminar/ Mini project/ MCQ/ Role Play/ Group Discussion/ Debates/ Oral Presentations/ Poster Presentations/ Technical Presentations can also be provided course coordinator can choose any one/two components based on the nature of the course.

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B.E / B.Tech	M25MAT101 - MATRICES AND DIFFERENTIAL CALCULUS	L	T	P	TW+SL / SL	Total Hours	C
		60	15	0	45	120	4

Course Objectives	
1.	To develop the use of matrices that is needed by engineers for practical applications.
2.	To understand the concept of functions of several variables.
3.	To recognize and classify ordinary differential equations.
4.	To apply the concept of ordinary differential equations in engineering disciplines.
5.	To learn the applications of Laplace transforms in engineering.

SYLLABUS:

UNIT - I	MATRICES	15
Eigen values and Eigenvectors of a real matrix – Characteristic equation – Properties of Eigen values and Eigenvectors – Quadratic form: Nature, Reduction to canonical form by orthogonal transformation.		

UNIT - II	FUNCTIONS OF SEVERAL VARIABLES	15
Partial differentiation –Total derivative– Taylor's series expansion for functions of two variables – Maxima and minima of functions of two variables – Lagrange's method of undetermined multipliers.		

UNIT - III	ORDINARY DIFFERENTIAL EQUATIONS	15
Higher order linear ordinary differential equations with constant coefficients - Method of variation of parameters - Simultaneous differential equations		

UNIT - IV	APPLICATIONS OF ORDINARY DIFFERENTIAL EQUATIONS	15
Solution of specified differential equations connected with electric circuits - Law of Natural growth and decay - Simple harmonic motion (Differential equations and associated conditions need to be given).		

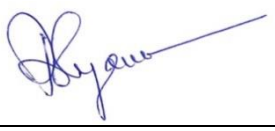
Approved by BoS Chairman

UNIT - V	LAPLACE TRANSFORM	15
Existence conditions - Properties (excluding proofs) - Transform of standard functions - Transforms of derivatives and integrals - Inverse Laplace transform - Applications to solution of linear second order ordinary differential equations with constant coefficients.		
		Total Hours: 120

Text Books	
1.	Grewal B.S.,"Higher Engineering Mathematics", Khanna Publishers, New Delhi, 43rd Edition, 2015.
2.	Bali N., Goyal M. and Watkins C., "Advanced Engineering Mathematics", Firewall Media –An imprint of Lakshmi Publications Pvt., Ltd., New Delhi, 7th Edition, 2015.
3.	Kreyszig Erwin, "Advanced Engineering Mathematics ", John Wiley and Sons, 10th Edition, New Delhi, 2015.
4.	George B. Thomas , Joel Hass , Christopher Heil , Maurice D. Weir, "Thomas' Calculus", Pearson,14th Edition, 2018.

Reference Books	
1.	Jain R.K. and Iyengar S.R.K., "Advanced Engineering Mathematics", Narosa Publications, New Delhi, 5th Edition, 2019.
2.	Srimantha Pal and Bhunia, S.C, "Engineering Mathematics" Oxford University Press, 2015.
3.	Ramana B V., "Higher Engineering Mathematics", Tata Mc Graw Hill Publishing Company, New Delhi, 2017.
4.	Veerarajan T., "Engineering Mathematics for Semester I and II", Tata Mc Graw Hill Publishing Company, New Delhi, 2019.
5.	Gean Duffy., "Advanced Engineering Mathematics with MATLAB", A CRC Press Company, Boca Raton London, New York Washington, D.C, 2nd edition 2009. (Free e-book downloaded from www.EasyEngineering.net.pdf).

Mooc/SWAYAM/NPTEL/Course Era/ Web Resources:	
1.	https://onlinecourses.nptel.ac.in/noc22_ma49/previewSS
2.	https://onlinecourses.nptel.ac.in/noc25_ma45/preview



Approved by BoS Chairman

Course Outcomes: Students will be able to	
CO1	Make use of Eigen values and Eigen vectors to reduce the quadratic form into canonical form and to find the powers of a square matrix.
CO2	Construct maxima and minima problems.
CO3	Solve differential equations which existing in different engineering disciplines.
CO4	Develop the applications of differential equations in various engineering field.
CO5	Apply Laplace transform and inverse transform to solve differential equations with constant coefficients.

Theory Course

Evaluation Pattern:				
Continuous Internal Assessment				**End Semester Examinations**
CIA I (Theory) (100 Marks)		CIA II (Theory) (100 Marks)		Theory End Semester Examinations (Examinations will be conducted for 100 Marks)
* Alternate Assessment Tool (AAT)	Written Test	* Alternate Assessment Tool (AAT)	Written Test	
40 Marks	60 Marks	40 Marks	60 Marks	
40 Marks				60 Marks
Total: 100 Marks				

***** AAT - Individual Assignment/ Case Study/ Seminar/ Mini project/ MCQ/ Role Play/ Group Discussion/ Debates/ Oral Presentations/ Poster Presentations/ Technical Presentations can also be provided course coordinator can choose any one/two components based on the nature of the course.

Approved by BoS Chairman

B.E / B.Tech	B25PCI101 – Physical Sciences (Common to ALL)	L	T	P	TW+SL SL	Total Hours	C
		60	0	30	30	120	4

Course Objectives	
1.	To gain knowledge on the basics of properties of matter, its applications and inculcate practical skills in the determination of elastic property of the materials.
2.	To acquire knowledge & experimental skills on the concepts of photonics and their applications in fiberoptics.
3.	To have adequate knowledge on the properties of modern engineering materials such as metallic glasses, shape memory alloys, nano materials and enhance the practical skills in determination of electrical properties of the materials.
4.	To make the students conversant with boiler feed water requirements, related problems, water treatment and inculcate practical skills in the water quality analysis.
5.	To make the students conversant with basics of electrochemical reactions.

SYLLABUS:

UNIT - I	PROPERTIES OF MATTER	15

Elasticity: Modulus, types of moduli of elasticity, stress-strain diagram and its uses-factors affecting elastic modulus and twisting couple, torsion pendulum; theory and experiment.

Bending of beams: Bending moment - uniform and non- uniform bending; theory and experiment- I-shaped girders and its applications.

Determination of rigidity modulus – Torsion pendulum

Determination of Young's modulus by uniform bending method.

Approved by BoS Chairman

UNIT - II	PHOTONICS AND FIBER OPTICS	15

Lasers: Properties of laser-spontaneous and stimulated emission-amplification of light by population inversion- Einstein's A and B coefficients - derivation – types of laser; Nd-YAG laser, industrial and medical applications.

Fiber Optics: Principle, numerical aperture and acceptance angle - types of optical fibers-fiber optic communication system-block diagram.

Determination of wavelength of the Laser using grating

Determination of Numerical aperture and acceptance angle of an optical fiber.

UNIT - III	ADVANCED ENGINEERING MATERIALS	15

Metallic glasses: Preparation, properties and applications.

Shape memory alloys (SMA): Characteristics, and properties of Ni-Ti alloy, application, advantages and disadvantages.

Nanomaterials: Properties - synthesis of Nano materials - top down approach - ball milling, bottom up approach- chemical vapour deposition – Sol Gel method - applications.

Determination of specific resistance of the wire using Carey Foster's Bridge.

UNIT - IV	WATER TECHNOLOGY	15

Hardness of water: Types, expression of hardness and their units, hardness problems, boiler troubles & its associated problems and terminologies.

Treatment of Boiler feed water: Internal treatment: carbonate, phosphate, colloidal, and calgon conditioning & External treatment: Ion exchange and Zeolite process.

Water treatment: Municipal water supply**-** Desalination of brackish water: Reverse osmosis.

Determination of total, temporary & permanent hardness of water by EDTA method.

Determination of Alkalinity in a water sample.

Approved by BoS Chairman

UNIT - V	ELECTROCHEMISTRY AND ENERGY DEVICES	15

Electrochemistry: Redox reaction - electrode potential – oxidation potential - reduction potential - Nernst equation (derivation only) – single electrode potential - measurement and applications - electrochemical series - significance.

Batteries: Types of batteries – alkaline battery, lead acid battery, lithium-ion battery H_2 - O_2 fuel cell.

Photo voltaic cell: Solar cells - principle, construction, working and applications.

Estimation of Fe(II) ions using potentiometer

Conductometric titration of mixture of acids vs strong base.

List of Experiments:

Expt. No.	Description of the Experiments
1.	Determination of rigidity modulus – Torsion pendulum.
2.	Determination of Young's modulus by uniform bending method.
3.	Determination of wavelength of the Laser using grating
4.	Determination of Numerical aperture and acceptance angle of an optical fiber.
5.	Determination of specific resistance of the wire using Carey Foster's Bridge.
6.	Preparation of nanoparticles (ZnO) by Sol-Gel method.
7.	Determination of total, temporary & permanent hardness of water by EDTA method.
8.	Determination of Alkalinity in a water sample.
9.	Estimation of Fe(II) ions using potentiometer
10.	Conductometric titration of mixture of acids vs strong base.
	Total Hours: (60+30+30) = 120

Approved by BoS Chairman

List of Equipment's:

Requirements for 60 Students		
Sl. No.	**Description of the Equipment**	**Quantity required (Nos.)**
1.	Travelling Microscope, Knife edge, Slotted weights	11
2.	Diode Laser (2mS power), He–Ne Laser source (2mW), Optical Fibre Kit	09
3.	Carey Foster Bridge	06
4.	Torsional Pendulum	06
5.	Potentiometer	10
6.	Conductivity meter	10
7.	Electronic balance	01
8.	Magnetic stirrer with hot plate	02

Text Books	
1.	Bhattacharya, D.K. & Poonam, T, "Engineering Physics", Oxford University Press, 2015.
2.	Gaur, R.K. & Gupta, S.L. "Engineering Physics", Dhanpat Rai Publishers, 2012.
3.	Raghavan, V. —Materials Science and Engineering: A First courseǁ. PHI Learning, 2015.
4.	Dara, S S and Umare, S S, "A Textbook of Engineering Chemistry", Chand S & Company Ltd., New Delhi, 2015.
5.	Jain, P C and Monika Jain, "Engineering Chemistry" Dhanpat Rai Publishing Company Pvt. Ltd., New Delhi, 2015
6.	Vogel's Textbook of Quantitative Chemical Analysis, 8th edition, 2014.

Reference Books	
1.	Halliday, D., Resnick, R. & Walker, J. "Principles of Physics"", Wiley, 2015.
2.	S.M Murugavel, G. Senthil kumar – materias Science- VRB Publications,2018.
3.	Senthil Kumar, G. Physics Laboratory I & II, VRB publishers Pvt. Ltd., Chennai (2016).
4.	Friedrich Emich, "Engineering Chemistry", Scientific International Pvt. Ltd., New Delhi, 2014.
5.	Prasanta Rath, "Engineering Chemistry" , Cengage Learning India Pvt. Ltd., Delhi, 2015.
6.	Shikha Agarwal, "Engineering Chemistry - Fundamentals and Applications", Cambridge University Press, Delhi, 2015.

Approved by BoS Chairman

Mooc/SWAYAM/NPTEL/Course Era/ Web Resources:	
1.	https://onlinecourses.nptel.ac.in/noc21_ce45/preview
2.	https://archive.nptel.ac.in/courses/115/102/115102124/
3.	https://onlinecourses.nptel.ac.in/noc20_ph07/preview
4.	https://nptel.ac.in/courses/118104008
5.	https://www.youtube.com/watch?v=Sa0WfA9UGG0
6.	https://www.youtube.com/watch?v=aUKBO06_ymw
7	https://youtu.be/X9l9y8bcECg?si=rXdPqukkB2j4gfkN

Course Outcomes: Students will be able to	
CO1	Categorize the basics of properties of matter and its applications, classify the elastic properties of materials by using uniform, non-uniform bending method and torsional pendulum apparatus. (K4)
CO2	Explain the basics of Laser, Fiber Optics and their applications, determination of Wavelength of laser and acceptance angle, numerical aperture of optical fiber. (K5)
CO3	Justify the concepts of electrical, magnetic properties of Modern engineering materials, determination of Specific resistance of the material. (K5)
CO4	Determine the hardness of water and its suitability for domestic and industrial utilization. (K5)
CO5	Interpret the principles of electrochemical reactions, energy devices and its engineering applications. (K5)

Approved by BoS Chairman

For Credit: 4 (Integrated Course)

<table>
<tr><th colspan="7">Evaluation Pattern:</th></tr>
<tr><th colspan="5">Continuous Internal Assessment</th><th colspan="2">End Semester Examinations</th></tr>
<tr><td colspan="2">CIA I (Theory)
(100 Marks)</td><td colspan="2">CIA II (Theory)
(100 Marks)</td><td colspan="2">(Practical)
(100 Marks)</td><td rowspan="2">Theory End Semester Examinations (Examinations will be conducted for 100 Marks)</td><td rowspan="2">Practical End Semester Examinations (Examinations will be conducted for 100 Marks)</td></tr>
<tr><td>* Alternate Assessment Tool (AAT)</td><td>Written Test</td><td>* Alternate Assessment Tool (AAT)</td><td>Written Test</td><td>* Evaluation of Laboratory experiment, results & Record</td><td>Test (Model)</td></tr>
<tr><td>40 Marks</td><td>60 Marks</td><td>40 Marks</td><td>60 Marks</td><td>75 Marks</td><td>25 Marks</td><td rowspan="2">35 Marks</td><td rowspan="2">15 Marks</td></tr>
<tr><td colspan="4">25 Marks</td><td colspan="2">25 Marks</td></tr>
<tr><td colspan="6">50 Marks</td><td colspan="2">50 Marks</td></tr>
<tr><td colspan="8">Total: 100 Marks</td></tr>
</table>

***** AAT - Individual Assignment/ Case Study/ Seminar/ Mini project/ MCQ/ Role Play/ Group Discussion/ Debates/ Oral Presentations/ Poster Presentations/ Technical Presentations can also be provided course coordinator can choose any one/two components based on the nature of the course.

Approved by BoS Chairman

B.E / B.Tech	B25CSI101 – C PROGRAMMING (Common to ALL)	L	T	P	TW +SL SL	Total Hours	C
		60	0	30	30	120	4

Course Objectives	
1.	To understand the basics of C programming including data types, operators, and control structures.
2.	To study algorithms using functions, loops, and conditionals in C.
3.	To learn programs involving arrays, strings, and pointers for memory management.
4.	To study dynamic memory allocation and file handling in C programs.
5.	To learn computational problems by writing, debugging, and optimizing C programs.

SYLLABUS:

UNIT - I	INTRODUCTION	9

Overview of C programming language: History and evolution of C - Importance of C in modern programming - Structure of a C program: Components of a C program -Compilation and execution process - Data types: Primitive data types (int, float, char, double) – variables: Declaration, initialization, and scope of variables – Constants: (const, macros) - Operators in C: Arithmetic, relational, logical operators - Assignment, increment, and decrement operators- Bitwise operators - Input and output functions: Formatting input/output - Handling multiple inputs - Introduction to debugging tools: Using IDEs or debugging tools like GDB

UNIT - II	CONTROL STRUCTURES	9

Conditional statements (if, else, switch): Nested conditionals and logical expressions - Use of break, continue, goto in control flow - Looping structures (for, while, do-while) - Nested loops and control statements - Introduction to functions: Function declaration, definition, and calling - Passing arguments by value and by reference - Recursion basics

UNIT - III	ARRAYS AND STRINGS	9

Arrays: single-dimensional - multi-dimensional - Array initialization and accessing array elements - Memory representation of arrays - Strings and string handling functions: Declaration and initialization of strings - strlen(), strcpy(), strcat() - String comparison and formatting - Arrays of structures - Memory representation of arrays

UNIT - IV	POINTER AND DYNAMIC MEMORY ALLOCATION	9

Pointers: Definition – Declaration - Dereferencing and pointer arithmetic - Pointer arithmetic - Pointers to variables, arrays, and functions - Dynamic memory allocation (malloc, calloc, realloc, free – memory leaks and pointer errors - Passing functions as arguments - Function pointers and callbacks - Using pointers with structures - Dynamic allocation for arrays of structures

UNIT - V	FILE HANDLING	9

File operations opening, reading, writing, and closing files - file pointer management - fopen(), fclose(), fread(), fwrite() - Error handling in file operations - Structures and unions – Recursion - Recursive functions and termination conditions, and linked lists

Approved by BoS Chairman

List of Experiments:

Expt. No.	Description of the Experiments
1.	Write a simple "Hello, World!" program (CO1)
2.	Implement programs using variables and different operators (CO1)
3.	Write a program using if and switch statements (CO2)
4.	Implement programs using loops (e.g., factorial, Fibonacci series) (CO2)
5.	Program using one-dimensional and multi-dimensional arrays (CO3)
6.	Implement a program to manipulate strings (e.g., string reversal, length calculation) (CO3)
7.	Write programs using pointers (e.g., swapping values using pointers) (CO4)
8.	Implement dynamic memory allocation for arrays and matrices(CO4)
9.	Write a program to read and write data to a file (CO5)
10.	Implement a simple program using structures and file handling (CO5)
	Total Hours: (45+15+30) = 90

List Of Equipment's:

Requirements for a Batch of 30 Students		
Sl. No.	**Description of the Equipment**	**Quantity required (Nos.)**
1.	HP Make, Core i5, 11th Generation, 16GB RAM PCs, Operating systems: Windows* 10 or later, macOS, and Linux. Turbo C/C++ 4.5	30

Text Books	
1.	"The C Programming Language", Brian W. Kernighan and Dennis M. Ritchie, PHI, 2nd Edition, 1988.
2.	"C Programming: A Modern Approach", K. N. King, W. W. Norton & Company, 2nd Edition, 2008.

Reference Books	
1.	"C: The Complete Reference", Herbert Schildt, McGraw-Hill, 4th Edition, 2018
2.	"C Programming Language", Yashavant Kanetkar, BPB, 7th Edition, 2019
3.	"Data Structures Using C", Aaron M. Tenenbaum, Yedidyah Langsam, Moshe J. Augenstein, Pearson, 2nd Edition, 2004
4.	"C Programming: The Ultimate Guide for Beginners", John P. Heine, CreateSpace, 2017

Approved by BoS Chairman

Mooc/SWAYAM/NPTEL/Course Era/ Web Resources:	
1	C Programming Basics - Swayam
2	C Programming for Beginners - NPTEL
3	C for Everyone: Programming Fundamentals – UC Santacruz – Coursera
4	Introduction to C Programming -edX

Course Outcomes: Students will be able to	
CO1	Recall key concepts like syntax, operators, and control structures in C programming.
CO2	Comprehend the flow of control in programs using loops, conditionals, and functions.
CO3	Make Use of control structures, arrays, and pointers to write functional C programs.
CO4	Identify and debug errors, and analyze memory usage in C programs.
CO5	Design and develop complex C programs integrating multiple concepts and solving real-world problems.

Evaluation Pattern:

Continuous Internal Assessment						End Semester Examinations	
CIA I (Theory) (100 Marks)		CIA II (Theory) (100 Marks)		(Practical) (100 Marks)		Theory End Semester Examinations (Examinations will be conducted for 100 Marks)	Practical End Semester Examinations (Examinations will be conducted for 100 Marks)
* Alternate Assessment Tool (AAT)	Written Test	* Alternate Assessment Tool (AAT)	Written Test	* Evaluation of Laboratory experiment, results & Record	Test (Model)		
40 Marks	60 Marks	40 Marks	60 Marks	75 Marks	25 Marks		
25 Marks				25 Marks		35 Marks	15 Marks
50 Marks						50 Marks	
Total: 100 Marks							

***** AAT - Individual Assignment/ Case Study/ Seminar/ Mini project/ MCQ/ Role Play/ Group Discussion/ Debates/ Oral Presentations/ Poster Presentations/ Technical Presentations can also be provided course coordinator can choose any one/two components based on the nature of the course.

Approved by BoS Chairman

B.E / B.Tech	B25MET101 ENGINEERING GRAPHICS (COMMON TO ALL)	L	T	P	TW +SL / SL	Total Hours	C
		45	0	30	45	120	4

COURSE OBJECTIVES	
1.	To understand the importance of the drawing in engineering applications.
2.	To develop graphic skills for communication of concepts, ideas and design of engineering products.
3.	To expose them to existing national standards related to technical drawings.
4.	To improve their visualization skills so that they can apply this skill in developing new products.
5.	To improve their technical communication skill in the form of communicative drawings.

CONCEPTS AND CONVENTIONS (NOT FOR EXAMINATION)

Importance of graphics in engineering applications - Use of drafting instruments - BIS conventions and specifications — Size, layout and folding of drawing sheets — Lettering and dimensioning.

UNIT - I	PLANE CURVES AND FREEHAND SKETCHING	9 + 6

Basic Geometrical constructions, Curves used in engineering practices: Conics — Construction of ellipse, parabola and hyperbola by eccentricity method — Construction of cycloid — construction of involutes of square and circle — Drawing of tangents and normal to the above curves - Visualization concepts and Free Hand sketching: Visualization principles — Representation of Three Dimensional objects — Layout of views- Freehand sketching of multiple views from pictorial views of objects. Practicing three dimensional modeling of simple objects by CAD Software (Not for examination)

UNIT - II	PROJECTION OF POINTS, LINES AND PLANE SURFACE	9 + 6

Orthographic projection- principles-Principal planes-First angle projection-projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes - Determination of true lengths and true inclinations by rotating line method and traces. Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method.

Approved by BoS Chairman

UNIT - III	PROJECTION OF SOLIDS	9 + 6
Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes and parallel to the other by rotating object method.		

UNIT - IV	PROJECTION OF SECTIONED SOLIDS AND DEVELOPMENT OF SURFACES	9 + 6
Sectioning of above solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other — obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids — Prisms, pyramids cylinders and cones. Practicing three dimensional modeling of simple objects by CAD Software (Not for examination)		

UNIT - V	ISOMETRIC AND PERSPECTIVE PROJECTIONS	9 + 6
Principles of isometric projection — isometric scale - Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions - Perspective projection of simple solids-Prisms, pyramids and cylinders by visual ray method. Practicing three dimensional modeling of isometric projection of simple objects by CAD Software (Not for examination)		
Total Hours: (45 + 30 + 45) = 120		

Course Outcomes : Students will be able to	
CO1	Construct various engineering curves and create freehand sketches of multiple views from pictorial representations.
CO2	Apply the principles of orthographic projection to draw views of points, lines, and plane surfaces inclined to principal planes.
CO3	Illustrate projections of basic solid objects such as prisms, pyramids, cylinders, and cones in different orientations.
CO4	Develop sectional views and lateral surface developments of simple and truncated solids using standard projection methods.
CO5	Draw the isometric and perspective projections of simple solids.

Text Books	
1.	K. V. Natarajan, “A text book of Engineering Graphics”, 28th Edition, Dhana Lakshmi Publishers, Chennai, 2015.
2.	N.D. Bhatt and V.M. Panchal, “Engineering Drawing”, Charotar Publishing House, 53rd Edition, 2014.

Approved by BoS Chairman

Reference Books	
1.	K. Venugopal and V. Prabhu Raja, “Engineering Graphics”, New Age International Publishers, 2017.
2.	K.R. Gopalakrishna., “Engineering Drawing” (Vol. I & II combined) Subhas Publications, Bangalore, 2018.
3.	N.S Parthasarathy and Vela Murali, “Engineering Drawing”, Oxford University Press, 2015.

MOOC / SWAYAM / NPTEL / Course Era / Web Resources	
1.	https://nptel.ac.in/courses/112103019
2.	https://www.coursera.org/projects/autocad-for-beginners-drafting-blueprints-and-schematics
3.	https://www.youtube.com/watch?v=ht9GwXQMgpo

Evaluation Pattern						
Continuous Internal Assessment						End Semester Examinations
CIA I (Theory) (100 Marks)		CIA II (Theory) (100 Marks)		CIA III (Theory) (100 Marks)		
* Individual Assignment / Case Study / Seminar / Mini project / MCQ	Written Test	* Individual Assignment / Case Study / Seminar / Mini project / MCQ	Written Test	* Individual Assignment / Case Study / Seminar / Mini project / MCQ	Written Test	Theory End Semester Examinations (Examinations will be conducted for 100 Marks)
40 Marks	60 Marks	40 Marks	60 Marks	40 Marks	60 Marks	
40 Marks						60 Marks
						Total : 100 Marks

* Role Play / Group Discussion / Debates / Oral Presentations / Poster Presentations / Technical Presentations can also be provided course coordinator can choose any one/two components based on the nature of the course.

Approved by BoS Chairman

B.E / B.Tech	B25HST101 - HERITAGE OF TAMILS (Common to all Branches)	L	T	P	TW+SL SL	Total Hours	C
		15	0	0	15	30	1

UNIT I LANGUAGE AND LITERATURE	3
Language Families in India - Dravidian Languages – Tamil as aClassical Language - Classical Literature in Tamil – Secular Nature of Sangam Literature – Distributive Justice in Sangam Literature - Management Principles in Thirukural - Tamil Epics and Impact of Buddhism & Jainism in Tamil Land - Bakthi Literature Azhwars and Nayanmars - Forms of minor Poetry - Development of Modern literature in Tamil - Contribution of Bharathiyar and Bharathidhasan.	

UNIT II HERITAGE - ROCK ART PAINTINGS TO MODERN ART – SCULPTURE	3
Hero stone to modern sculpture - Bronze icons - Tribes and their handicrafts - Art of temple car making - - Massive Terracotta sculptures, Village deities, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments - Mridhangam, Parai, Veenai, Yazh and Nadhaswaram - Role of Temples in Social and Economic Life of Tamils.	

UNIT III FOLK AND MARTIAL ARTS	3
Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leatherpuppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils.	

UNIT IV THINAI CONCEPT OF TAMILS	3
Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature - Aram Concept of Tamils - Education and Literacy during Sangam Age - Ancient Cities and Ports of Sangam Age - Export and Import during Sangam Age - Overseas Conquest of Cholas.	

Approved by BoS Chairman

UNIT V CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE	3
Contribution of Tamils to Indian Freedom Struggle - The Cultural Influence of Tamils over the other parts of India – Self-Respect Movement - Role of Siddha Medicine in Indigenous Systems of Medicine – Inscriptions & Manuscripts – Print History of Tamil Books.	
	Total hours : 30

TEXT-CUM-REFERENCE BOOKS

1. தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் – முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை – ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department ofArchaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

For Credit: 1

Evaluation Pattern:	
Continuous Internal Assessment	
CIA (Theory) (100 Marks)	
* Alternate Assessment Tool (AAT)	Written Test
40 Marks	60 Marks
Total: 100 Marks	

* AAT - Individual Assignment/ Case Study/ Seminar/ Mini project/ MCQ/ Role Play/ Group Discussion/ Debates/ Oral Presentations/ Poster Presentations/ Technical Presentations can also be provided course coordinator can choose any one/two components based on the nature of the course.

Approved by BoS Chairman

B.E / B.Tech	B25MEP101 ENGINEERING PRACTICES LABORATORY (GROUP - A & B) (COMMON TO ALL BRANCHES)	L	T	P	TW +SL / SL	Total Hours	C
		0	0	15	15	30	1

COURSE OBJECTIVES	
1.	Drawing pipe line plan; laying and connecting various pipe fittings used in common household plumbing work, Sawing, planning, making joints in wood materials used in common household wood work.
2.	Wiring various electrical joints in common household electrical wire work.
3.	Welding various joints in steel plates using arc welding work; Machining various simple processes like turning, drilling, tapping in parts; Assembling simple mechanical assembly of common household equipments, Making a tray out of metal sheet using sheet metal work.
4.	Soldering and testing simple electronic circuits; Assembling and testing simple electronic components on PCB.

GROUP – A (CIVIL & MECHANICAL)

I	Civil Engineering Practices	12

Plumbing Works

Making basic pipe connections involving the fittings like valves, taps, coupling, unions, reducers, elbows and other components used in household fittings.

Carpentry

Preparation of wooden joints by sawing, planning and cutting.

1.	Planning & Polishing operation
2.	Half lap joint
3.	Cross lap joint

Approved by BoS Chairman

II	Mechanical Engineering Practices	18
Welding Workshop Study of welding tools and equipment's - Study of various welding methods - Instruction of BI standards and reading of welding drawings.		
Exercise in arc welding for making		
1.	Lap joint	
2.	Butt joint	
3.	Demonstration of gas welding and cutting.	
Machine Shop		
1.	Drilling and Tapping	
2.	Lathe Exercise – Facing operation	
3.	Lathe Exercise – Straight turning and Chamfering	
Sheet metal		
Making of small parts using sheet metal		
1.	Making of a square tray	
Demonstration		
Making of small parts using sheet metal		
1.	Demonstration on 3D Printing	
2.	Demonstration on Line follower robot	

Approved by BoS Chairman

GROUP – B (ELECTRICAL & ELECTRONICS)	30

Expt. No.	Description of the Experiments
1.	Residential house wiring using switches, fuse, indicator, lamp and energy meter.
2.	Fluorescent lamp and Stair case wiring.
3.	Measurement of electrical quantities – voltage, current, power & power factor in RLC circuit.
4.	Measurement of energy using single phase energy meter.
5.	Measurement of resistance to earth of an electrical equipment.
6.	Study of Electronic components and equipment's – Resistor color coding
7.	Measurement of AC signal parameter (peak-peak, rms period, frequency) using CRO.
8.	Study of logic gates AND, OR, EX-OR and NOT.
9.	Soldering & desoldering practices.
	Total Instructional hours : 60

Course Outcomes : Students will be able to	
CO1	Explain the pipe connections and identify the various components used in plumbing.
CO2	Develop simple wooden joints using wood working tools and simple components using lathe and drilling machine.
CO3	Construct simple lap, butt and tee joints using arc welding equipment and simple parts using sheet metal.
CO4	Construct Residential house wiring, Fluorescent lamp wiring and Stair case wiring.
CO5	Measure electrical quantities such as voltage, current, power & power factor in RLC Circuit, resistance to earth, AC signal parameter (peak-peak, RMS period, frequency) and ripple factor.
CO6	Examine logic gates (AND, OR, EOR and NOT), Electronic components and equipment's.

Approved by BoS Chairman

GROUP – A (CIVIL & MECHANICAL)			
Sl. No.	**Description of Equipment**		**Quantity required**
1.	Assorted components for plumbing, Consisting of metallic pipes, plastic pipes, flexible pipes, couplings, unions, elbows, plugs and other fittings.		15
2.	Carpentry vice (fitted to work bench)		15
3.	Standard woodworking tools		15
4.	Models of industrial trusses, door joints, furniture joints		5
5.	Power Tools :		
	a.	Rotary Hammer	2
	b.	Demolition Hammer	2
	c.	Circular Saw	2
	d.	Planer	2
	e.	Hand Drilling Machine	2
	f.	Jigsaw	2
6.	Arc welding transformer with cables and holders		5
7.	Welding booth with exhaust facility		5
8.	Welding accessories like welding shield, chipping hammer, wire brush, etc.		5
9.	Oxygen and acetylene gas cylinders, blow pipe and other welding outfit.		2
10.	Centre lathe		2
11.	Hearth furnace, anvil and smithy tools		2
12.	Moulding table, foundry tools		2
13.	Power Tool : Angle Grinder		2
14.	Study-purpose items : Centrifugal pump, Airconditioner		1

Approved by BoS Chairman

GROUP – B (ELECTRICAL & ELECTRONICS)		
Sl. No.	**Description of Equipment**	**Quantity required**
1.	Assorted Electrical Components for House Wiring	15 sets
2.	Electrical Measuring Instruments	10 sets
3.	Iron Box	1
4.	Fan and Regulator	1
5.	Emergency Lamp	1
6.	Megger	1
7.	Digital Live Wire Detector	2
8.	Soldering Guns	10
9.	Assorted Electronic Components for Making Circuits	50
10.	Multipurpose PCBs	10
11.	Multi Meters	10
12.	Telephone	2
13.	FM radio	2
14.	Regulated Power Supply	2
15.	CRO (30 MHz)	2
16.	Bread board	10
17.	Digital IC types (IC 7432, IC 7408, IC 7400, IC 7404, IC 7402, IC 7486)	Each 10

Approved by BoS Chairman

B.E / B.Tech	B25MCT102 - UNIVERSAL HUMAN VALUES (Common to ALL)	L	T	P	TW +SL SL	Total Hours	C
		15	0	0	15	30	0

Course Objectives	
1.	To help students understand the need, basic guidelines, process of value education, self-exploration about themselves.
2.	To facilitate the students to understand harmony at all the levels of human living in the family.
3.	To facilitate the students to understand harmony at all the levels of human living in the Society.
4.	To facilitate the students in applying the understanding of harmony in Universal Human order and Ethical Conduct.
5.	To facilitate the students in applying the understanding of harmony in existence in their profession and lead an ethical life.

SYLLABUS:

UNIT - I	Introduction to Value Education and Harmony in the Human Being	6
Value Education- Definition, Concept and Need- Basic Guidelines and Process of Value Education- Happiness and Prosperity- The Body as an Instrument of the Self- Understanding Harmony in the Self.		

UNIT - II	Harmony in the Family	6
Family as a basic unit of Human Interaction and Values in Relationships- the Basics for Respect, Affection, Guidance, Reverence, Glory - Gratitude and Love.		

UNIT - III	Harmony in the Society	6
. Understanding Harmony in the Society- Visualizing a universal harmonious order in society- Undivided Society- Universal Order.		

Approved by BoS Chairman

UNIT - IV	Social Ethics	6
The Basics and defects for Ethical Human Conduct- Human Rights violation and Social Disparities- Universal Human Order and Ethical Conduct.		

UNIT - V	Professional Ethics	6
Value based Life and Profession- Professional Ethics and Right Understanding- Issues in Professional Ethics – the Current Scenario.		

Text Books	
1.	A.N Tripathy, New Age International Publishers, 2003.
2.	Bajpai. B. L ,New Royal Book Co, Lucknow, Reprinted, 2004.
3.	Bertrand Russell Human Society in Ethics & Politics George Allen & Unwin Ltd., London 1954.

Reference Books	
1.	Gaur. R.R. , Sangal. R, Bagaria. G.P, A Foundation Course in Value Education, Excel Books, 2009.
2.	Gaur. R.R. , Sangal. R , Bagaria. G.P, Teachers Manual Excel Books, 2009.
3.	Sharma I.C. Ethical Philosophy of India Nagin & co Julundhar, Johnsen Publishing, New York, 1965.
4.	Mortimer. J. Adler, – Whatman has made of man, Dyer Press,2007
5.	William Lilly Introduction to Ethic Allied Publisher, Allied Publishers Pvt. Ltd.,2018.

Mooc/SWAYAM/NPTEL/Course Era/ Web Resources:	
1.	https://www.youtube.com/c/UniversalHumanValues
2.	Universal Human Values and Professional Ethics - YouTube Playlist
3.	Universal Human Values - YouTube
4.	AICTE Universal Human Values (UHV) Webinar - YouTube
5.	Universal Human Values and Ethics - YouTube Playlist

Approved by BoS Chairman

Course Outcomes: Students will be able to		
CO1	Understand the Fundamentals of Value Education	(K2)
CO2	Apply Harmony in the Human Self and Body	(K3)
CO3	Infer the Role of Family and Society in Human Values	(K2)
CO4	Build Awareness of Social Ethics and Conduct	(K3)
CO5	Apply Ethical Values in Personal and Professional Life	(K3)

Theory Course

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***** AAT - Individual Assignment/ Case Study/ Seminar/ Mini project/ MCQ/ Role Play/ Group Discussion/ Debates/ Oral Presentations/ Poster Presentations/ Technical Presentations can also be provided course coordinator can choose any one/two components based on the nature of the course.

Approved by BoS Chairman

SEMESTER-II

B.E / B.Tech	B25HST202 – PROFESSIONAL ENGLISH (Common to ALL)	L	T	P	TW +SL / SL	Total Hours	C
		30	0	0	30	60	2

Course Objectives	
1.	To improve students ability to read and comprehent complex technical content.
2.	To improve their ability to read and write effective business correspondence.
3.	To develop the writing skills through appropriate vocabulary and grammar.
4.	To help learners make effective presentations in writing and speaking.
5.	To demonstrate communication skills through LSRW.

SYLLABUS:

UNIT - I	ENGLISH FOR COMMUNICATION	6

Vocabulary development: Abbreviations and Acronyms
Grammar: Auxiliary verbs and usage
Reading: Use of extensive reading texts - Analytical and critical reading practice
Listening: Listening process & practice - Exposure to recorded & structured talks, Listening Comprehension
Writing: Writing Effective sentences: appropriateness, brevity & clarity in writing – Note-making, writing articles and reviews
Speaking - Introducing oneself and peer members - Interpersonal Conversation -Developing persuasive Speech

UNIT - II	BUSINESS CORRESPONDENCE	6

Vocabulary development: Different between British and American spelling and vocabulary
Grammar: Types of questions
Reading: Reading emails and business correspondence
Listening: Listening to presentations and meetings interviews
Writing: business letters-Inviting Quotations, Placing Orders, writing official letters- complaint letters, invitation letters- requisition letters
Speaking: Participating in formal and informal conversations

UNIT - III	TECHNICAL WRITING	6

Vocabulary development: Writing definitions and Purpose statements
Grammar: Spotting errors
Reading: Technical journals and business documents
Listening: Listening to technical process
Writing: Writing captions for products and posters, rearranging jumbled sentence, process descriptions
Speaking: Participating in role play based on workplace content

Approved by BoS Chairman

UNIT - IV	TECHNICAL PRESENTATIONS	6
Vocabulary development: Word formation - Compound nouns Grammar: Types of sentences Reading: Business and technical reports, proposals Listening: Listening to Group discussion Writing: Instructions and recommendations Speaking: Describing situations, events and objects		

UNIT - V	REPORTS AND DOCUMENTATION	6
Vocabulary development: Idioms, Cause and effect expressions Grammar: Reported speech Reading: Circulars and notice in in professional environment Listening: Business meetings and presentations, Writing: Memorandum, Agenda and minutes of meetings Speaking: Giving welcome speech and vote of thanks		
		Total Hours: (30+30) = 60

Text Books	
1.	Dhanavel, S.P. English and Communication Skills for Students of Science and Engineering. Orient Blackswan, Chennai, 2011.
2.	Raman, Meenakshi & Sangeetha Sharma. Technical Communication: Principles and Practice.Oxford University Press, New Delhi.2011.

Reference Books	
1.	Board of editors. Fluency in English A Course book for Engineering and Technology. Orient Blackswan, Hyderabad: 2016
2.	Rizvi, Ashraf. M. Effective Technical Communication. Tata McGraw-Hill, New Delhi.2005
3.	Great Business English - Phrases, Verbs and Vocabulary for Speaking Fluent English by Hilary F. MooreMba·2013

Approved by BoS Chairman

Mooc/SWAYAM/NPTEL/Course Era/ Web Resources:	
1.	https://onlinecourses.nptel.ac.in/noc21_hs16/preview
2.	https://onlinecourses.swayam2.ac.in/cec24_lg08/preview
3.	https://onlinecourses.swayam2.ac.in/aic21_ge24/preview

Course Outcomes: Students will be able to	
CO1	Apply Listening and reading skills to Communicate effectively and confidently in English.(K3)
CO2	Develop writing skills through business correspondence. (K3)
CO3	Build their communication skills effectively and fluently in real-life situation. (K3)
CO4	Utilize appropriate strategies for Technical writing and Presentation skills. (K3)
CO5	Demonstrate ability of professional correspondence through LSRW skills. (K2)

Theory Course

Evaluation Pattern:				
Continuous Internal Assessment				**End Semester Examinations**
CIA I (Theory) (100 Marks)		CIA II (Theory) (100 Marks)		Theory End Semester Examinations (Examinations will be conducted for 100 Marks)
* Alternate Assessment Tool (AAT)	Written Test	* Alternate Assessment Tool (AAT)	Written Test	
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Approved by BoS Chairman

B.E / B.Tech	B25HST203 – GERMAN LANGUAGE (Common to ALL)	L	T	P	TW +SL SL	Total Hours	C
		30	0	0	30	60	2

Course Objectives	
1.	To introduce learners to the fundamentals of the German language, including vocabulary, grammar, pronunciation, and everyday expressions.
2.	To enable students to engage in basic conversations in German for common situations such as greetings, introductions, shopping, and dining.
3.	To develop listening and speaking skills through interactive lessons and practical exercises.
4.	To help learners recognize and write the German alphabet and construct simple sentences using basic grammar.
5.	To build foundational reading and writing skills using commonly used words, phrases, and sentence structures in German.

SYLLABUS:

UNIT - I	Introduction to German Scripts	9

Theme and Text (Introduction to German-German script, Deutsche Namen, Daily Greetings and Expressions) Grammar ('wh' questions, das Alphabet)-Speak Action (Buchstabieren, sich und andere vorstellen nach Namen und Herkunft fragen, internationale Wörter auf Deutsch verstehen, jemanden begrüßen) pronunciation (Buchstabieren J,V,W,Y, Long vowels A,E,I,O,U Pronunciation of Ä. Ö, Ü) To learn (internationale Wörter in Texten finden, Wörter sortieren)

Theme and Text (Gespräche im caf'e, Getränkekarte, Telefon-buch, Namen, Rechnungen) - Grammar (Frägesatze mit wie, woher, wo, was Verben in präsens Singular und Plural, das Verb Sein, Personalpronomen und Verben)- Speak Action (eine Gespräch beginnen sich und andere vorstellen zählen, etwas bestellen und bezhalen Telefonnummern und verstehen)-pronunciation (Wortakzent in Verben und in Zahlen) - To learn (Grammatiktabelmit einem Redemittelkasten arbeiten)

UNIT - II	Numbers and Nominative Case	9

Theme and Text (Numbers 1 to 12 (Eins bis Zwolf) -20, 30, 40, 90 (zwanzig-Neunzig) -All Numbers (1-10000) German Currency (Euro) Basic Mathematics (plus, Minus, Malen, Geteilt durch)) Grammar (Introduction of verbs-Have Verb-To Come, To Speak, To Read, To Drive, To Fly, To write, To Eat, To sleep, To take etc.,)

Theme and Text (Communication in course) Grammar (Singular and Plural, Artikel: der,das,die/ ein,eine, verneinung kein, keine, Komposita: das Kursbuch) - Speak Action (Gegenständen fragen/ Gegenstände benennen im kurs) pronunciation (word accent Marking, Umlaute ö ä ü hören und sprechen) To learn (Lernkarien schreiben, Memotipps, eine Regel selbst finden)

Theme and Text (City, Town, Language: Nachbar, Sprachen, Sehenswürdigkeiten in Europa) Grammar (Past tense for Sein, W-Frage, Aussagesatz und Satzfrage) - Speak Action (about city and siteseeing) - pronunciation (Satzakzent in Frage- und Aussagesätzen) -To learn (eine Regel ergänzen, eine Grammatiktabelle erarbeiten, Notizen machen)

Approved by BoS Chairman

UNIT - III	Akkusative Case and Prepositions	9

Theme and Text (Menschen und Hauser, Furniture catalogue, E-Mail, House information) Grammar (possesivartikel im Nominativ, Artikel im Akkusativ, Adjektive im satz, Graduierung mit zu) Speak Action (Whonung bescreiben about perons and things)-pronunciation (consonantch)To learn (wortschatz systematisch)

Theme and Text (Termine - Appointment and punctuality in Germany)-Grammar (questions with wann?, Preposition (am, um, von... bis), verneinung mit nicht, trennbare verben, präteritum von haben) - Speak Action (Daily plan making, time commitment, excuse for late coming) - pronunciation (consonants-p,b,t,d/kg)-To learn (Rollenkarten arbeiten)
Theme and Text (orientation in the working area, go for work, floor plan city plan, office and computer) Grammar (preposition: in,neben, unter, auf, vor, hinter, an, zwischen, bei und mit Datic) Speak Action (workplace, work, giving appointments) pronunciation (consonants: f,w und v) - To learn (Making notice in the calendar)

UNIT - IV	DATIV CASE AND PREPOSITIONS	9

Theme and Text (Holiday and Party, holiday plan, party plan in Germany) (regular and irregular verbs) - Speak Action (holiday speak, accident, Ich-Text schreiben) -pronunciation (lange und kurze vokale markieren) - To learn (Text Order)
Theme and Text (organising an Excursion to Berlin through city orientation, Bus plan, City plan, postcard Excursion programme) -Grammar (preposition: in, durch, über + Akkusativ: zu, an... vorbei Dativ, Modalverb wollen) Speak Action (Tourism, culture, postcard preparation, travel description) - pronunciation (r and 1)- To leam (plaket making)
Theme and Text (Beruf und all Tag, Visiten karten, wörterbuch) Grammar- Speak Action (profession, statistic speaking) pronunciation (n,ng and nk)- To learn (wörterbuch, text information in tabel)

UNIT - V	Verb Conjugations and their Usages	9

Theme and Text (Haushaltstipp, kochrezept, mafße und gewichte, Mahlzeiten und Gerichte) - Grammar (jeden Tag, manchmal, nie, Question welche, Comparison viel, gut, gern) -Speak Action (about eat, drink question and answers) - pronunciation (e,en,el,er) To leam (Text auswerten und zusammenfassen)
Theme and Text (Clothing, colour, weather) Grammar (Adjecktive im Akkusativ, unbestimmer Artikel) Speak Action (weather, dress and colour understanding) pronunciation (e-o-ö and ie-u-ü) To learn (wetter and Farben interkulturelle)
Theme and Text (in supermarket, purchase, House Maintenance, Emotions, Sports, Body parts) Grammar (Modal Verb) Speak Action (Body parts) To learn (Rollenkarten arbeiten)

Total Hours : 60

Approved by BoS Chairman

Text Books	
1.	Funk, Kuhn, Demme, "Studio D A1 Deutsch als Fremdsprache" Goyal Publishers and Distributors, 2016
2.	Hueber, "Fit for Goethe Zertifikat Al (Start Deutsch 1)" Goyal Publishers and Distributors, 2016

Reference Books	
1.	Stefanie Dengler, "Netzwerk Deutsch Als Fremdsprache Al" by Goyal Publishers & Distributors Pvt Ltd
2.	Fran Martin, "Grammar Tables for Student of German" by Independently Published, 2017

Mooc/SWAYAM/NPTEL/Course Era/ Web Resources:	
1.	www.memrise.com/courses/english/german/
2.	www.deutsch-lernen.com/

Course Outcomes: Students will be able to	
CO1	Identify and write the German alphabets accurately using correct spelling and pronunciation. (K1)
CO2	Produce simple spoken sentences using basic phonetic sounds of the German language. (K3)
CO3	Apply relevant vocabulary to participate in basic everyday conversations in German. (K3)
CO4	**Use** appropriate grammatical structures to construct correct spoken and written expressions in German. (K3)
CO5	Interpret spoken or written conversations and derive the correct meaning based on context. (K4)

Approved by BoS Chairman

Theory Course

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Approved by BoS Chairman

B.E / B.Tech	B25HST204 – JAPANESE LANGUAGE (Common to ALL)	L	T	P	TW +SL SL	Total Hours	C
		30	0	0	30	60	2

Course Objectives	
1.	To develop foundational proficiency in the four core Japanese language skills—speaking, listening, reading, and writing—for effective everyday communication.
2.	To understand and apply basic Japanese grammar, vocabulary, and pronunciation to form simple and meaningful sentences.
3.	To strengthen communication skills through interactive methods such as role-plays, group activities, and real-life scenarios.
4.	To build learners' confidence in using Japanese in practical contexts, encouraging active participation and engagement.
5.	To lay the groundwork for advanced language learning and cultural immersion, fostering interest in deeper exploration of Japanese society and traditions.

SYLLABUS:

UNIT - I	Introduction to Japanese Scripts and Basic Greetings	9
Japanese Scripts (Hiragana & Katakana) - Daily greetings and expressions - Introduction to grammar particles - N1 wa N2desu N1 wa N2 ja arimasen - Phrase/Sentence ka N1 mo N2desu Ni no N2desu Honorific suffixes (san, kun, chan) - Demonstrative words (Ko, So. A & Do series) - Soudesu Soudesuka - Soudesune - Sou ja arimasen/Chigaimasu - SI ka S2 kaN1(noun) wa N2(place)desu - Numbers - Days of the week - Days of the month		

UNIT - II	Introduction to Concept of Time	9
Ji, fun, pun-Ima wa nan ji desuka - Introduction to verbs (group 1, group II, group III verbs) - Verb tense forms V masu V mashita V masen V masendeshita N(time) ni V-NI kara N2made-N1 to N2-N to V-Sne-N(place) e ikimasu/kimasu/kaerimasu - Doko(e) mo ikimasen/ikimasendeshita itsuS yo Introduction to de particle N(place) de V-N(vehicle) de ikimasu/kimasu/kaerimasuN(tool) de V-No V(transitive) - No Shimasu Usage of nan and nani V masenka V mashou, mashouka Honorific prefixes(o/go) -"word/sentence" wa-go de nan desuka N(person) ni agemasu/moraimasu/kuremasu V mou mashita.		

UNIT - III	Introduction to Adjectives	9
I ending adjectives - na ending adjectives - forms of adjectives(negative form, past form) -I ending adjective →ku/Na ending adjective ni narimasu-degrees of adjectives - S1 ga S2 -Nga adjective-N ga arimasu/wakarimasu - degrees of adverbs - degrees of quantity - S1 kara S2 Doushite N1(place) ni N2(noun) ga arimasu NI(noun) wa N2(place) ni arimasu/imasu-N1(noun) no N2(position)-N1 ya N2 nado.		

Approved by BoS Chairman

UNIT - IV	INTRODUCTION TO COUNTERS	9

Counters for objects Counters for person - Ikutsu-nan+counter suffix - kurai and gurai - Quantifier(period) ni frequency counter(kai) Quantifier/Noun+dake N1 wa N2 yori "adjective" desu N1 to N2to Dochira ga "adjective" desuka N no naka de nani/doko/dare/itsu ga "adjective" desuka - Interrogatives ka/mo/demo.

UNIT - V	Verb Conjugations and their Usages	9

5.1 V masu form and its usages : N ga hoshii desu V masu form tai desu V masu form ni ikimasu/kimasu/kaerimasu -V masu form mashouka.

5.2 V te form and its usages : V te form kudasai V te form imasu V te form mo iidesu V te form wa ikimasen -shirimasu, shirimasen, shitte imasu-te form of adjectives-V1 te form kara V2-douyatte - V te form agemasu/kuremasu/moraimasu

5.3 V nai form and its usages : V nai form de kudasai- V nai form kereba narimasen V nai form to V nai form kutemo iidesu-N(time) madeni V.

5.4 V dictionary form and its usages : V dictionary form koto ga dekimasu - Shumi wa N suru/V dictionary form koto desu - N no/Quantifier(time)/V1 dictionary form maeni V2-nakanaka-zehi/zettai/mochiron – V dictionary form jikan/youji/yakusoku.

5.5: V ta form and its usages : V ta form koto ga arimasu - V ta ri, V ta ri Shimasuusage of plain form and polite form - kedo - noun modification using V plain form V plain form/N no toki-. 5.6: If clause V dictionary form to V ta form ra V te form/I adj→kute/Na adj→de/N de mo-moshi/ikura.

Total Hours :60

Text Books	
1.	Minna no Nihongo, Japanese for Everyone: Elementary main textbook 1-1 & 1-2". 1 edition, Goyal Publishers and Distributors Pvt. Ltd., Delhi, 2007.
2.	"Basic Kanji 320", published by Meguro Language Centre, Tokyo.

Reference Books	
1.	Genki: An Integrated Course in Elementary Japanese, Eri Banno, Yoko Ikeda, and Yutaka Ohno,, The Japan Times, 2011.
2.	Nihongo So-matome: JLPT N5 grammar" authored and published by Ask Publications, 2021 edition.
3.	Great Business English - Phrases, Verbs and Vocabulary for Speaking Fluent English by Hilary F. MooreMba·2013

Approved by BoS Chairman

Mooc/SWAYAM/NPTEL/Course Era/ Web Resources:	
1.	www.japaneselifestyle.com
2.	www.learn-japanese.info/
3.	www.kanjisite.com/
4.	www.learn-hiragana-katakana.com/typing-hiragana-characters/

Course Outcomes: Students will be able to	
CO1	Identify Hiragana and Katakana characters accurately without errors. (K2)
CO2	Construct simple conversations using basic phonetic sounds and sentence structures in Japanese. (K3)
CO3	Explain the concept of time in Japanese through the use of verbs, tenses, and related vocabulary. (K2)
CO4	Apply suitable vocabulary and expressions to engage in basic conversations in Japanese. (K3)
CO5	Interpret spoken conversations and demonstrate understanding by deriving the correct meaning. (K4)

Theory Course

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Approved by BoS Chairman

B.E / B.Tech	B25MAT201- INTEGRAL CALCULUS AND COMPLEX ANALYSIS (Common to all Branches)	L	T	P	TW +SL / SL	Total Hours	C
		60	15	0	45	120	4

Course Objectives	
1.	To recognize various techniques of integration.
2.	To apply integration techniques in evaluating area and volume of solids.
3.	To develop the use of Vector calculus in two and three dimensional spaces.
4.	To demonstrate understanding of the basic concepts of complex differentiation.
5.	To understand Cauchy theorem and Cauchy integral formulae and apply these to evaluate complex contour integrals.

SYLLABUS:

UNIT - I	INTEGRAL CALCULUS	15

Riemann sum – Definite and Indefinite integrals - Substitution rule (Exponential, logarithmic, Trigonometric functions) – Integration by parts –Bernoulli' s formula- Integration of Rational functions by Partial fraction.

UNIT - II	MULTIPLE INTEGRALS	15

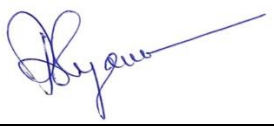
Double integrals: – Double integrals in Cartesian coordinates - Double integrals in Polar coordinates – Area enclosed by plane curves – Area in polar co-ordinates - Triple integrals: Evaluation of triple integrals - Volume as triple integral (Simple problems).

UNIT - III	VECTOR CALCULUS	15

Gradient and directional derivative - Divergence and curl - Solenoidal and Irrotational vector fields - Green's theorem in a plane, Gauss divergence theorem and Stoke's theorem (excluding proofs) – Verification of theorem and applications (for cubes and rectangular parallellopipeds).

UNIT – IV	COMPLEX DIFFERENTIATION	15

Analytic functions - Cauchy-Riemann equations (excluding proof) – Properties of analytic function – Harmonic conjugate- Construction of analytic function by Milne Thomson method – Bilinear



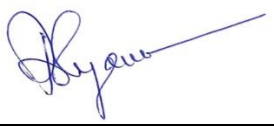
Approved by BoS Chairman

UNIT - V	COMPLEX INTEGRATION	15
Cauchy‘s integral theorem – Cauchy‘s integral formula – residues - Cauchy‘s Residue theorem – Evaluation of real integrals – Use of circular contour and semicircular contour (excluding poles on real axis).		
		Total Hours: 120

Text Books	
1.	Grewal B.S.,”Higher Engineering Mathematics”, Khanna Publishers, New Delhi, 43rd Edition, 2014.
2.	Kreyszig Erwin, "Advanced Engineering Mathematics ", John Wiley and Sons, 10th Edition, New Delhi, 2015.
3.	George B. Thomas , Joel Hass , Christopher Heil , Maurice D. Weir, “Thomas' Calculus”, Pearson, 14th Edition, 2018.

Reference Books	
1.	Bali N., Goyal M. and Watkins C., “Advanced Engineering Mathematics”, Firewall Media - An imprint of Lakshmi Publications Pvt., Ltd., New Delhi, 7th Edition, 2015.
2.	Jain R.K. and Iyengar S.R.K., “Advanced Engineering Mathematics”, Narosa Publications, New Delhi, 5th Edition 2019.
3.	O‘Neil, P.V.,”Advanced Engineering Mathematics”, Cengage Learning India Pvt. Ltd, New Delhi, 7th Edition 2017.
4.	Sastry, S.S, “Engineering Mathematics", Vol. I & II, PHI Learning Pvt. Ltd, 4th Edition, New Delhi, 2014.
5.	Wylie, R.C. and Barrett, L.C., “Advanced Engineering Mathematics”, (Tata McGraw Hill Education Pvt. Ltd), 6th Edition, New Delhi, 2012.
6.	Gean Duffy., “Advanced Engineering Mathematics with MATLAB”, A CRC Press Company, Boca Raton London, New York Washington, D.C, 2nd edition 2009. (Free e- book downloaded from www.EasyEngineering.net.pdf)

Mooc/SWAYAM/NPTEL/Course Era/ Web Resources:	
1.	https://onlinecourses.nptel.ac.in/noc25_ma19/preview
2.	https://onlinecourses.nptel.ac.in/noc22_ma75/preview
3.	https://onlinecourses.nptel.ac.in/noc21_ma16/preview



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Course Outcomes: Students will be able to	
CO1	Develop Fundamental Theorem of Calculus, techniques of Integration such as substitution, partial fractions and integration by parts.
CO2	Make use of integration to compute area and volume.
CO3	Apply the line, surface and volume integrals for verification of Green's, Gauss and Stokes theorems.
CO4	Develop an understanding of the standard techniques of complex variable theory in particular analytic function
CO5	Identify contour integrations with the help of residue theorem.

Theory Course

<table>
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Approved by BoS Chairman

B.E / B.Tech	B25CSI202 – PROBLEM SOLVING USING PYTHON PROGRAMMING (Common to Aero, Agri, BT and Mech)	L	T	P	TW +SL SL	Total Hours	C
		60	0	30	30	120	4

Course Objectives	
1.	To introduce Python programming as a tool for problem-solving.
2.	To teach students basic concepts of Python syntax, data types, and control structures.
3.	To develop algorithmic thinking and computational problem-solving skills.
4.	To implement Python solutions for mathematical, logical, and real-world problems.
5.	To enhance debugging and optimization techniques while solving problems using Python.

SYLLABUS:

UNIT - I	INTRODUCTION	9
Overview of Python: Introduction to Python programming language, installation, and setup - Basic Syntax: Comments, indentation, keywords, identifiers, and statements - Variables and Data Types: Integers, floats, strings, booleans. Type conversion - Operators: Arithmetic, comparison, logical, bitwise, and assignment operators - Input/Output: Reading input using input(), printing output using print() - Control Structures: Conditional statements (if, else, elif), loops (for, while)		

UNIT - II	DATA STRUCTURES AND FUNCTIONS	9
Lists: Definition, operations (indexing, slicing, appending, removing elements), list functions - Tuples: Definition, immutability, tuple operations - Dictionaries: Key-value pair mapping, adding, removing, and accessing values - Sets: Definition, set operations (union, intersection, difference, etc.) - Functions: Defining functions, function arguments (positional, default, variable-length), return values - Recursion: Understanding recursion, recursive functions, base case and recursive case		

UNIT - III	ALGORITHMS AND PROBLEM SOLVING TECHNIQUES	9
Basic Algorithms: Introduction to algorithms, pseudocode, and flowcharts - Searching Algorithms: Linear search, binary search - Sorting Algorithms: Bubble sort, selection sort, insertion sort - Time Complexity: Introduction to Big-O notation, analyzing algorithmic efficiency - Problem-Solving Strategies: Divide and conquer, greedy approach, dynamic programming (basic introduction)		

UNIT - IV	OBJECT-ORIENTED PROGRAMMING IN PYTHON	9
Classes and Objects: Creating classes, objects, and attributes - Methods: Instance methods, class methods, and static methods - Inheritance: Inheriting classes, method overriding, and constructor inheritance - Polymorphism: Dynamic and static polymorphism in Python - Encapsulation: Access specifiers (public, private, protected), getter and setter methods - File Handling: Opening, reading, writing, and closing files. Working with text and binary files		

UNIT - V	ALGORITHMS AND APPLICATIONS	9
String Manipulation: String methods (concatenation, slicing, searching, formatting) - Mathematical Computations: Solving problems involving prime numbers, Fibonacci series, factorial computation - Applications of Python in Problem Solving: Solving simple real-world problems (e.g., a basic calculator, temperature conversion, etc.) - Libraries: Introduction to libraries such as math, random, and datetime for solving practical problems - Error Handling: Exception handling using try, except, and finally blocks - Project Work: Solving a simple project-based problem using all concepts learned		

List of Experiments:

Expt. No.	Description of the Experiments
1.	Write a program to print "Hello, World!" (CO1)
2.	Implement basic arithmetic operations using Python (CO2)
3.	Write a program to calculate the factorial of a number (CO2)
4.	Implement linear search and binary search algorithms (CO3)
5.	Implement sorting algorithms: bubble sort, selection sort (CO3)
6.	Write a program to reverse a string and check if it is a palindrome (CO4)
7.	Implement a simple calculator using functions (CO4)
8.	Write a program to find the Fibonacci series up to N terms (CO4)
9.	Implement a basic class with methods and attributes (CO4)
10.	Write a program to solve a simple problem involving file input/output (e.g., reading from and writing to a text file) (CO5)
	Total Hours: (45+15+30) = 90

List of Equipment's:

Requirements for a Batch of 30 Students		
Sl. No.	**Description of the Equipment**	**Quantity required (Nos.)**
1.	HP Make, Core i5, 11th Generation, 16GB RAM PCs, Operating systems: Windows* 10 or later, macOS, and Linux. Python IDE	30

Text Books	
1.	"Python Programming: An Introduction to Computer Science", John Zelle, Franklin, Beedle & Associates, 3rd Edition, 2017.
2.	"Python for Everybody", Charles R. Severance, CreateSpace Independent Publishing Platform, 1st Edition, 2016.

Reference Books	
1.	"Learning Python", Mark Lutz, O'Reilly Media, 5th Edition, 2013.

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2.	"Automate the Boring Stuff with Python", Al Sweigart, No Starch Press, 2nd Edition, 2019.
3.	"Problem Solving with Algorithms and Data Structures using Python", Bradley N. Miller, David L. Ranum, Franklin, Beedle & Associates, 2005.

Mooc/SWAYAM/NPTEL/Course Era/ Web Resources:	
1	"Python for Data Science" - NPTEL
2	"Introduction to Python Programming" - Coursera
3	"Python for Everybody Specialization" - Coursera (by University of Michigan)
4	"Python Programming" - edX (by MIT)

Course Outcomes: Students will be able to	
CO1	Recall and understand the basic syntax, data types, and control structures in Python.
CO2	Develop problem-solving algorithms and implement them in Python.
CO3	Use Python to solve computational problems involving data manipulation, search, and sort algorithms.
CO4	Design and implement object-oriented programs using classes, inheritance, and polymorphism in Python.
CO5	Apply Python to solve real-world problems and perform file handling operations.

Evaluation Pattern:

Continuous Internal Assessment						**End Semester Examinations**	
CIA I (Theory) (100 Marks)		CIA II (Theory) (100 Marks)		(Practical) (100 Marks)		Theory End Semester Examinations (Examinations will be conducted for 100 Marks)	Practical End Semester Examinations (Examinations will be conducted for 100 Marks)
* Alternate Assessment Tool (AAT)	Written Test	* Alternate Assessment Tool (AAT)	Written Test	* Evaluation of Laboratory experiment, results & Record	Test (Model)		
40 Marks	60 Marks	40 Marks	60 Marks	75 Marks	25 Marks		
25 Marks				25 Marks		35 Marks	15 Marks
50 Marks						50 Marks	
Total: 100 Marks							

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B.E / B.Tech	B25CBI102 - APPLICATION DESIGN AND DEVELOPMENT (Common to All UG Branches)	L	T	P	TW +SL SL	Total Hours	C
		30	0	30	30	90	3

Course Objectives	
1.	Understand modern computer fundamentals, network basics, and webpage structure
2.	To Learn styling techniques using CSS and responsive design principles
3.	To Master fundamental JavaScript programming concepts
4.	To Develop skills for DOM manipulation, form handling, and error management
5.	To Become proficient with version control using Git, GitHub, and basic shell scripting

UNIT - I	Computer & Web Foundations	3
Computer basics: hardware (CPU, RAM, storage), software (OS, applications), I/O systems, input–process–output model - Networking essentials: Internet, WWW, client-server, HTTP/HTTPS - HTML5 fundamentals: structure, tags, semantic elements, headings, paragraphs, lists, tables, forms, media, links		

UNIT - II	CSS Styling & Responsive Design	3
CSS syntax and selectors, box model (margin/padding/border), typography, colors, backgrounds - Layout and responsive design: Flexbox, media queries - Frameworks: Introduction to Bootstrap & Tailwind CSS		

UNIT - III	JavaScript Fundamentals & Event - driven Programming	3
JS Basics Variables(var, let, const) - Data Types (String, Number, Boolean, Null, Undefined, Symbol, BigInt) - Operators(Arithmetic, Comparison, Logical, Assignment, Ternary) - Conditional Statements(if, else if, switch) - Loops(for, while, do...while, for...of, for...in, break, continue) - Function Declarations & Expressions - Arrow Functions - Parameters & Arguments Return Values - Function Scope - Event - Driven Programming - Event Listeners - Types of Events(click, input, load, etc.)		

UNIT - IV	DOM Manipulation, Forms & Advanced JavaScript	3
DOM Manipulation - DOM API Overview - Selecting Elements (getElementById, querySelector, etc.) - Updating Elements - Forms & Client - Side Validation - Input Elements & Accessing Values - Form Submission, Validating Inputs with JavaScript - Error Handling & Debugging - try...catch Block - throw Statement - Error Object - Debugging Tools(console.log, browser dev tools) - Asynchronous JavaScript - The Event Loop - Callback Function - Async / Await - Advanced Function Concepts - Types of Functions(Higher - order functions, IIFE)		

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UNIT - V	Control, GitHub & Shell Scripting	3
Git basics: init, clone, stage, commit, branching, merging, remote repos - Collaboration: pull requests, issues, contributions to GDG/Stack Overflow/Kaggle - Shell scripting: commands for file/process and user/group management.		

Expt. No.	Description of the Experiments
1	Write a basic HTML + JS program to display a welcome message and perform simple arithmetic using variables.
2	Create a JS program that takes user input and displays whether it's positive, negative, or zero.
3	Use JavaScript to generate star pattern dynamically.
4	Build a calculator web page using JS functions for add, subtract, multiply, divide.
5	Create a webpage with buttons that change the background color or update text content using the DOM API.
6	Develop a to-do list where items can be added and removed using event listeners.
7	Build a registration form (name, email, password) with client-side JS validation (e.g., email format, password length).
8	On form submission, validate data and redirect to a success page or display a confirmation message.
9	Accept a list of numbers from the user and display them in a table format with sum and average.
10	Use 2D arrays in JS to accept a matrix and display its transpose using the DOM.
11	Build a mini CRUD app using JS arrays and objects to manage student data (name, ID, grade).
12	Design a simple UI to manage books with title, author, ISBN, and implement search/filter features.
13	Create a multiple-choice quiz using JS objects and display results at the end.
14	Store and retrieve user preferences (like theme or font size) using localStorage.
15	Create a JS program that simulates fetching data from a server using Promise and async/await.
16	A user interface where users can add, update, delete entries (like name & email), and export the final list to a PDF.
	Total Instructional hours : (30+30) = 60

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Course Outcomes : Students will be able to	
CO1	Explain modern computer architecture, software, networks, SDLC, and effectively structure HTML5 documents
CO2	Apply the Style and layout webpages with CSS, including responsive design principles for creating web page/web site.
CO3	Develop JavaScript applications using core programming constructs
CO4	Build interactive web applications using DOM manipulation, form validation, redirection, and error handling
CO5	Make use of Git, GitHub, and shell scripting for collaborative development and deployment

Requirements for a Batch of 30 Students		
Sl. No.	**Description of the Equipment**	**Quantity required (Nos.)**
1.	HP Make, Core i5, 11th Generation, 16GB RAM PCs, Operating systems: Windows* 10 or later, macOS, and Linux. Turbo C/C++ 4.5	30

Text Books	
1.	Jon Duckett, "HTML and CSS: Design and Build Websites", John Wiley & Sons, Inc, 2011.
2.	Marijn, Haverbeke, "Eloquent JavaScript: A Modern Introduction to Programming", 3rd Edition, William Pollock Publisher, 2019.
3.	Scott Chacon and Ben Straub, "Pro Git", 2 nd Edition, APress Publication, 2024

Reference Books	
1.	Jennifer Robbins, "Learning Web Design: A Beginner's Guide to HTML, CSS, JavaScript, and Web Graphics", O'Reilly Media, Inc., 2012.
2.	Douglas Crockford, "JavaScript: The Good Parts", O'Reilly Publications, 2008
3.	Cameron Newham, "Learning the Bash Shell", 3rd Edition, O'Reilly Media, Inc, 2005
4.	https://www.freecodecamp.org/
5.	https://developer.mozilla.org/en-US/docs/Web/JavaScript
6.	https://www.codecademy.com/catalog/subject/web-development

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B. Tech.	B25BTT201 – BIOORGANIC CHEMISTRY	L	T	P	TW +SL / SL	Total Hours	C
		45	0	0	45	90	3

Course Objectives	
1.	To impart basics of organic chemistry.
2.	To relate organic chemical reactions with biological reality.
3.	To understand the properties of phytochemicals and their uses.

UNIT – I	ATOMS AND BONDING	6
Overview of bioorganic chemistry – atoms, electrons and orbitals - covalent Bonds - Octet rule - Polar covalent Bonds – Electronegativity - Electrophiles and Nucleophiles – Concept of Resonance - Inductive and mesomeric effects - formal charge - Resonance Acids and Bases - Acid Base equilibria - SP3 hybridization.		
UNIT – II	**STEREOCHEMISTRY**	**9**
Special properties of carbon as the centre of organic world - Fisher projections and absolute configurations - Stereochemical activity around the tetrahedral carbon - Cis- trans isomerism, Conformation analysis of ethane, butane and cyclohexane - optical activity and chiral centres - Optical activity of glucose.		
UNIT – III	**MECHANISM OF SUBSTITUTION AND ADDITION REACTION**	**9**
SN_1 and SN_2 reaction on tetrahedral carbon – Nucleophilic addition of aldehydes and ketones: Hydration, acetal formation, acetal protection – Reactions of carbonyl group with amines – esterification and ester hydrolysis – saponification of an ester – hydrolysis of amides - Ester enolates – Claisen condensation – Michaeal condensation – Substitution and addition reactions in the biological world, examples.		
UNIT – IV	**KINETICS AND CATALYSIS**	**9**
Reaction kinetics– Rate law and mechanism – Transition states- Intermediates – Trapping of intermediates – Reactivity – – Coenzymes - Proton transfer – metal ions – Intra molecular reactions – Covalent catalysis – Catalysis by organized aggregates and phases. Inclusion complexation		
UNIT – V	**CHEMISTRY OF NATURAL PRODUCTS**	**9**
Sources: microbial, animal and plants-general structure, function and uses of flavonoids, flavones, anthocyanins, tannins, alkaloids, isoprene, morphine, conanine, terpenes, carotenoids, quercetin, curcumin and cyanidin chloride.		
Total Hours: (45+45) = 90		

Text Books	
1.	Carey Francis A, “Organic Chemistry”, 8th Ed. Tata McGraw Hill, 2009.
2.	Page MI and Williams A, “Organic and Bioorganic Mechanisms”, Pearson, 2010
3.	Kalsi PS and Jagtap S, “Pharmaceutical, Medicinal and Natural Product Chemistry”, Narosa Publishing House, New Delhi, 2013.

Reference Books	
1.	Penney C and Dugas H, "Bioorganic Chemistry: A Chemical Approach to Enzyme Action" 3rd Edition, Springer, 2003.
2.	Chatwal GR, "Organic Chemistry of Natural products" Vol. I & II, Himalaya Publishing House, NewDelhi, 2011.
3.	Robert H T, Principles of Genetics, Tata McGraw Hill, 2002.
4.	Hardin J, and Bertoni G, "Becker's World of the Cell", 9th Ed. Pearson Education, 2018.

Course Outcomes After the successful completion of the course, the students will be able to,		Knowledge Level
CO1	Summarize basic concepts of organic chemistry.	K2
CO2	Interpret three-dimensional alignment of atoms in space.	K2
CO3	Identify substitution and addition mechanisms in biological world.	K3
CO4	Apply the concepts of kinetics and catalysis in organic chemistry.	K3
CO5	Examine important bioactive compounds along with their uses.	K4

Evaluation Pattern:						
Continuous Internal Assessment						End Semester Examinations
CIA I (Theory) (100 Marks)		CIA II (Theory) (100 Marks)		CIA III (Theory) (100 Marks)		Theory End Semester Examinations (Examinations will be conducted for 100 Marks)
* Individual Assignment/ Case Study/ Seminar/ Mini project/ MCQ	Written Test	* Individual Assignment/ Case Study/ Seminar/ Mini project/ MCQ	Written Test	* Individual Assignment/ Case Study/ Seminar/ Mini project/ MCQ	Written Test	
40 Marks	60 Marks	40 Marks	60 Marks	40 Marks	60 Marks	
40 Marks						60 Marks
Total: 100 Marks						

* Role Play/Group Discussion /Debates/Oral Presentations/Poster Presentations/Technical Presentations can also be provided course coordinator can choose any one/two components based on the nature of the course.

Approved by BoS Chairman

B. Tech.	B25BTT202 - CELL BIOLOGY AND GENETICS	L	T	P	TW +SL / SL	Total Hours	C
		45	0	0	45	90	3

Course Objectives	
1.	To understand the basic structure and functions of cell and its organelles.
2.	To provide insights about intercellular interactions.
3.	To understand the specific aspects of the cell cycle and explore different implications of cell cycle regulation.
4.	To know the fundamentals of genetics and sex determination.
5.	To understand the facts of evolutionary genetics.

UNIT - I	CELL STRUCTURE AND FUNCTIONS OF THE ORGANELLES	6
Introduction to cell biology; Comparison of eukaryotic and prokaryotic cells; cellular organelles – structure and functions- disorders related to organelles; biological membrane organization- fluid mosaic model - membrane proteins – functions of membrane proteins; cytoskeletal proteins.		
UNIT - II	**CELL TRANSPORT AND SIGNAL TRANSDUCTION**	**9**
Cell Transport: Passive and Active Transport, Permeases, Ion channels, ATP pumps. Na+, K+, Ca2+ pumps, Cotransport: uniport, symport antiporter system. Ligand gated, voltage gated channels, Agonists and Antagonists. Signal Transduction: Receptors – extracellular signalling, Cell surface and cytosolic receptors with examples; autocrine, paracrine, endocrine models; Secondary messengers – cAMP, cGMP, DAG and IP3; Growth hormones.		
UNIT - III	**CELL CYCLE AND REGULATION**	**9**
Cell cycle; cell division – types: mitosis and meiosis; cell cycle regulation – cyclins and CDKs – checkpoints – CDK inhibitors; cancer - oncogenes and tumour suppressor genes; apoptosis – MAPK and AKT pathways; Introduction to stem cells. Cell cycle analysis - Flow cytometry and Microscopic techniques.		
UNIT - IV	**MENDELIAN GENETICS AND SEX DETERMINATION**	**9**
Mendel's experiment and principle of segregation, monohybrid crosses dominance and recessiveness; Principle of independent assortment - dihybrid crosses; multiple alleles - ABO blood type, Rh factor alleles, Mendelian problems. Non- Mendelian ratios – Interaction of genes – codominance – incomplete dominance - linkage and crossing over.Mechanism of sex determination, sex differentiation, sex linked inheritance. – pedigree analysis.		
UNIT - V	**MUTATION AND EVOLUTIONARY GENETICS**	**9**
Mutations - spontaneous, physical and induced; applications of mutation; organization of DNA in mitochondria and plastids; cytoplasmic male sterility in plants; Genetic variation; random mating and Hardy–Weinberg method; inbreeding, outbreeding and assortative mating; genetic equilibrium, evolutionary genetics.		
Total Hours: (45+45) = 90		

Text Books	
1.	Simmons M J and Snustad DP, "Principles of Genetics", John Wiley, 2012.
2.	Lodish H, Berk A, Zipurursky S L, Matsudaria P, Baltimore D and Darnell J, "Molecular Cell Biology", WH Free Man and Company, 2000.

Reference Books	
1.	Gardner E J and Simmons M J and Snustad D P, “Principles of Genetics”, John Wiley, 2006.
2.	Rastogi S C, “Cell Biology, India”: New Age International Pub. Ltd., 2001.
3.	Robert H T, Principles of Genetics, Tata McGraw Hill, 2002.
4.	Hardin J, and Bertoni G, “Becker's World of the Cell”, 9th Ed. Pearson Education, 2018.

Course Outcomes After the successful completion of the course, the students will be able to,		Knowledge Level
CO1	Summarize the different types of cells and the structure and function of intracellular organelles	K2
CO2	Demonstrate the concept of cellular transport and signal transduction to unlock revolutionary advancements in healthcare and biotechnology	K2
CO3	Identify the different channels and signaling pathways involved in cell cycle for unveiling different therapeutic strategies	K3
CO4	Make use of the laws of Mendel to predict genetic inheritance.	K3
CO5	Examine the role of mutations in generating genetic diversity and driving evolutionary processes	K4

Evaluation Pattern:

Continuous Internal Assessment						End Semester Examinations
CIA I (Theory) (100 Marks)		CIA II (Theory) (100 Marks)		CIA III (Theory) (100 Marks)		Theory End Semester Examinations (Examinations will be conducted for 100 Marks)
* Individual Assignment/ Case Study/ Seminar/ Mini project/ MCQ	Written Test	* Individual Assignment/ Case Study/ Seminar/ Mini project/ MCQ	Written Test	* Individual Assignment/ Case Study/ Seminar/ Mini project/ MCQ	Written Test	
40 Marks	60 Marks	40 Marks	60 Marks	40 Marks	60 Marks	
40 Marks						60 Marks
Total: 100 Marks						

* Role Play/Group Discussion /Debates/Oral Presentations/Poster Presentations/Technical Presentations can also be provided course coordinator can choose any one/two components based on the nature of the course.

Approved by BoS Chairman

B.E / B.Tech	B25HST201- TAMILS AND TECHNOLOGY (Common to all Branches)	L	T	P	TW+SL SL	Total Hours	C
		15	0	0	15	30	1

UNIT I WEAVING AND CERAMIC TECHNOLOGY	3
Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) – Graffiti on Potteries.	

UNIT II DESIGN AND CONSTRUCTION TECHNOLOGY	3
Designing and Structural construction House & Designs in household materials during Sangam Age - Building materials and Hero stones of Sangam age – Details of Stage Constructions in Silappathikaram - Sculptures and Temples of Mamallapuram - Great Temples of Cholas and other worship places - Temples of Nayaka Period - Type study (Madurai Meenakshi Temple)- Thirumalai Nayakar Mahal - Chetti Nadu Houses, Indo - Saracenic architecture at Madras during British Period.	

UNIT III MANUFACTURING TECHNOLOGY	3
Art of Ship Building - Metallurgical studies - Iron industry - Iron smelting,steel -Copper and goldCoins as source of history - Minting of Coins – Beads making-industries Stone beads -Glass beads - Terracotta beads -Shell beads/ bone beats - Archeological evidences - Gem stone types described in Silappathikaram.	

UNIT IV AGRICULTURE AND IRRIGATION TECHNOLOGY	3
Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompu of Chola Period, Animal Husbandry - Wells designed for cattle use - Agriculture and Agro Processing - Knowledge of Sea - Fisheries – Pearl - Conche diving - Ancient Knowledge of Ocean - Knowledge Specific Society.	

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UNIT V SCIENTIFIC TAMIL & TAMIL COMPUTING	3
Development of Scientific Tamil - Tamil computing – Digitalization of Tamil Books – Development of Tamil Software – Tamil Virtual Academy – Tamil Digital Library – Online Tamil Dictionaries – Sorkuvai Project.	
	Total Hours: 30

TEXT-CUM-REFERENCE BOOKS

1. தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் – முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருநை – ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - 'Sangam City C ivilization on the banks of river Vaigai' (Jointly Published by: Department ofArchaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

For Credit: 1

Evaluation Pattern:	
Continuous Internal Assessment	
CIA (Theory) (100 Marks)	
* Alternate Assessment Tool (AAT)	Written Test
40 Marks	60 Marks
Total: 100 Marks	

* AAT - Individual Assignment/ Case Study/ Seminar/ Mini project/ MCQ/ Role Play/ Group Discussion/ Debates/ Oral Presentations/ Poster Presentations/ Technical Presentations can also be provided course coordinator can choose any one/two components based on the nature of the course.

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B. Tech.	B25BTP201 – CELL BIOLOGY LABORATORY	L	T	P	TW +SL / SL	Total Hours	C
		0	0	45	15	60	2

Course Objectives	
1.	To Prepare biological material for staining, staining procedure and visualization of stained slides.
2.	To identify the different stages of cell division in a biological material.
3.	To acquire knowledge in the techniques involved with the sub cellular fractionation of cell organelles.

Expt. No.	List of Experiments
1.	Introduction to microscopes — Principles and working of different microscopes.
2.	Identification of given plant, animal and bacterial cells & their components by microscopy.
3.	Preparation of microscope slide for Dicot leaf section.
4.	Permanent slide preparation.
5.	Staining for different stages of mitosis in *Allium cepa* (Onion).
6.	Cell viability assay - Osmosis and Tonicity — Trypan blue staining.
7.	Identification of blood cells by Giemsa staining.
8.	Identification of Barr Bodies in epithelial cells by Buccal Smear.
9.	Subcellular Fractionation and isolation of chloroplast from plant cells.
10.	Staining and visualization of mitochondria.
	Total Instructional hours : 30

Course Outcomes After the successful completion of the course, the students will be able to,		Knowledge Level
CO1	Explain the concept and working of various microscopes.	K2
CO2	Develop slides for the staining procedure and visualization of materials.	K3
CO3	Interpret the stages of cell division.	K2
CO4	Identify the various types of cells and their viability.	K3
CO5	Inspect the principle behind the sub-cellular fractionation of organelles and the techniques involved.	K4

References	
1.	Cooper, G.M. and Hausman, R.E., (2009). The Cell: A Molecular Approach 5th ed., ASM Press & Sunderland (Washington DC), Sinauer Associates, MA, ISBN: 978-0-87893-300- 6.
2.	Lodish, H., Berk, A., Zipursky, S.L., Matsudaira, P., Baltimore, D. and Darnell. J., (2012) Molecular Cell Biology 7th ed., W.H. Freeman & Company (New York), ISBN: 13:978-1- 4641-0981-2 / ISBN: 10: 1-4641-0981-8.
3.	Alberts, B., Johnson, A., Lewis, J., and Enlarge, M., (2008) Molecular Biology of the Cell 5 th ed., Garland Science (Princeton).

LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS

Sl. No.	Description of the Equipment	Quantity required (Nos.)
1.	pH meter	1
2.	Microscope	2
3	UV-Vis Spectrophotometer	1
4.	Colorimeter	2
5.	Heating mantle	2
6.	Hot Air Oven	1
7.	Weigh balance	1
8	Water bath	1

Evaluation Pattern:		
Continuous Internal Assessment		**End Semester Examinations**
* Evaluation of Laboratory experiment, results & Record	Test (Model)	Practical End Semester Examinations (Examinations will be conducted for 100 Marks)
75 Marks	25 Marks	
60 Marks		40 Marks
Total: 100 Marks		

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B.E/B.Tech	B25CEP101 – DESIGN THINKING (Common to ALL)	L	T	P	TW+SL	C
		0	0	15	15	1

Course Objectives	
1.	To understand the needs of the user.
2.	To develop the students as a good designer by imparting creativity and problem-solving ability.
3.	To generate multiple concepts using various creativity tools and thinking styles.
4.	To design and demonstrate innovative ideas using prototypes.
5.	To learn the Iterative process of ideation, prototyping and testing.

MODULE-I	INTRODUCTION AND IDENTIFYING THE NEED
Understanding the unique needs of the user - empathize - define - ideate - prototype - test. Case Studies - Develop appreciation for the design process and its application in specific settings (Guest lectures, design-based Videos, Field visits).	

MODULE-II	PROBLEM FORMULATION
Framing a problem statement neutrally using adequate checks. Case studies.	

MODULE-III	CONCEPT GENERATION
Generate multiple concepts using various creativity tools and thinking styles.	

MODULE-IV	PROTOTYPING
Select from ideas and make quick prototypes (mock-ups) using available material.	

MODULE-V	EVALUATION
Iterative process of ideation, prototyping and testing-Take the mock-ups to users for feedback and iterate process till users feel delighted.	

Total Hours: 30

Approved by BoS Chairman

Learning Resources	
1	Design Thinking: A guide to creative problem solving for everyone, Andrew Pressman, Routledge Taylor and Francis group, 2019, 1st edition.
2	Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation, Tim Brown, Harper Business, 2019.
3	Engineering Design, George E. Dieter, Linda C. Schmidt, McGraw-Hill Education, 2019, 5th edition.
4	Product design and development, Ulrich, K., Eppinger, S. and Yang, M., 2020, 7th edition.
5	Online Resources: https://www.arvindguptatoys.com/ https://honeybee.org/ https://dschool.stanford.edu/resources/getting-started-with-design-thinking https://designthinking.ideo.com/
Course Outcomes: Students will be able to	
CO1	Identify the user needs.
CO2	Develop a suitable problem statement.
CO3	Apply multiple concepts using various creativity tools and thinking styles.
CO4	Design and demonstrate innovative ideas using prototypes.
CO5	Evaluate and create users feel delighted product.

Activities:

Some of the activities which are undertaken as a part of this course include:

- Field Visits
- Case Studies on innovation, failures etc.
- Guest lecture
- Group Discussions
- Presentation by student
- Experiential learning workshops.

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B.E / B.Tech	B25MCT201- Holistic Insights into UN SDGs (Common to ALL)	L	T	P	TW +SL / SL	Total Hours	C
		15	0	0	15	30	1

Course Objectives	
1.	To understand the origin, purpose, and significance of the UN Sustainable Development Goals (SDGs).
2.	To explore the 17 SDGs, their interconnections, and challenges in achieving them.
3.	To analyze global and local case studies of SDG implementation.
4.	To evaluate the role of governments, businesses, and individuals in sustainable development.
5.	To develop practical solutions and action plans for achieving SDGs at community and policy levels

SYLLABUS:

UNIT - I	INTRODUCTION TO SUSTAINABLE DEVELOPMENT & SDGS	6

Concept of **sustainability** and its evolution.

UN Millennium Development Goals (MDGs) vs. Sustainable Development Goals (SDGs).

Overview of the **17 SDGs**, their targets, and indicators.

Importance of **global collaboration** for sustainable development.

UNIT - II	PEOPLE-CENTERED SDGS (SDG 1–6)	6

SDG 1: No Poverty – Causes, measures & policies.

SDG 2: Zero Hunger – Food security & sustainable agriculture.

SDG 3: Good Health & Well-being – Universal healthcare & disease prevention.

SDG 4: Quality Education – Inclusive and equitable education.

SDG 5: Gender Equality – Women's empowerment & equal opportunities.

SDG 6: Clean Water & Sanitation – Water conservation & access to sanitation.

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UNIT - III	ECONOMIC & INFRASTRUCTURE SDGS (SDG 7–12)	6

SDG 7: Affordable & Clean Energy – Renewable energy solutions.

SDG 8: Decent Work & Economic Growth – Inclusive economic policies.

SDG 9: Industry, Innovation & Infrastructure – Sustainable development & digital transformation.

SDG 10: Reduced Inequalities – Social inclusion & global justice.

SDG 11: Sustainable Cities & Communities – Smart urban planning & resilience.

SDG 12: Responsible Consumption & Production – Circular economy & waste management.

UNIT - IV	ENVIRONMENTAL SDGS (SDG 13–15)	6

SDG 13: Climate Action – Climate change impacts & mitigation strategies.

SDG 14: Life Below Water – Ocean conservation & marine biodiversity.

SDG 15: Life on Land – Forest preservation & biodiversity protection.

UNIT - V	Governance & Global Partnerships (SDG 16–17)	6

SDG 16: Peace, Justice & Strong Institutions – Human rights & good governance.

SDG 17: Partnerships for the Goals – Role of international cooperation, businesses & individuals.

Text Books	
1.	Sachs, J. D. (2015). The Age of Sustainable Development. Columbia University Press.
2.	United Nations (2015). Transforming Our World: The 2030 Agenda for Sustainable Development.
3.	Griggs, D., Stafford-Smith, M., Gaffney, O., & Rockström, J. (2017). Sustainable Development Goals: Harnessing Business to Achieve the SDGs Through Finance, Technology and Innovation. Routledge.
4.	Mebratu, D., & Swilling, M**. (2019).** Transformational Infrastructure for Development of a Wellbeing Economy. Springer.

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Reference Books	
1.	Leal Filho, W. (Ed.). (2020). Encyclopedia of the UN Sustainable Development Goals. Springer.
2.	Sachs, J. D. (2021). The Decade of Action: Mobilizing the World to Achieve the SDGs. Columbia University Press.

Mooc/SWAYAM/NPTEL/Course Era/ Web Resources:	
1.	United Nations Sustainable Development Goals (SDGs) – https://sdgs.un.org
2.	United Nations Development Programme (UNDP) – https://www.undp.org
3.	The World Bank – Sustainable Development – https://www.worldbank.org/en/topic/sustainabledevelopment
4.	OECD Sustainable Development – https://www.oecd.org/sdgs/
5.	Global Sustainable Development Report (GSDR) – https://sdgs.un.org/gsdr
6.	Nature Sustainability – https://www.nature.com/natsustain/

Course Outcomes: Students will be able to	
CO1	Explain the origin, purpose, and significance of the UN Sustainable Development Goals.
CO2	Summarize the 17 SDGs, their interconnections, and challenges in achieving them.
CO3	Interpret global and local case studies of SDG implementation.
CO4	Describe the roles of governments, businesses, and individuals in sustainable development.
CO5	Illustrate practical solutions and action plans for achieving SDGs at community and policy levels.

Approved by BoS Chairman

Theory Course

<table>
<tr><th colspan="5">Evaluation Pattern:</th></tr>
<tr><th colspan="4">Continuous Internal Assessment</th><th>End Semester Examinations</th></tr>
<tr><td colspan="2">CIA I (Theory)
(100 Marks)</td><td colspan="2">CIA II (Theory)
(100 Marks)</td><td rowspan="2">Theory End Semester Examinations
(Examinations will be conducted for 100 Marks)</td></tr>
<tr><td>* Alternate Assessment Tool (AAT)</td><td>Written Test</td><td>* Alternate Assessment Tool (AAT)</td><td>Written Test</td></tr>
<tr><td>40 Marks</td><td>60 Marks</td><td>40 Marks</td><td>60 Marks</td><td></td></tr>
<tr><td colspan="4">40 Marks</td><td>60 Marks</td></tr>
<tr><td colspan="5">Total: 100 Marks</td></tr>
</table>

***** AAT - Individual Assignment/ Case Study/ Seminar/ Mini project/ MCQ/ Role Play/ Group Discussion/ Debates/ Oral Presentations/ Poster Presentations/ Technical Presentations can also be provided course coordinator can choose any one/two components based on the nature of the course.

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