



**SRI VENKATESWARA COLLEGE OF ENGINEERING,**  
(An Autonomous Institution, Affiliated to Anna University, Chennai – 600025)

## **B.Tech., Information Technology**

***CURRICULUM AND SYLLABUS***  
***REGULATION – 2022***  
***CHOICE BASED CREDIT SYSTEM***

Curriculum Revision No:	01	Board of Studies recommendation date :	6.04.2023	Academic Council Approved date:	21.4.2023
Salient Points of the revision	01.	Included 3 <sup>rd</sup> sem syllabus			
	02.				
	03.				
	04.				
	05.				

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**REGULATIONS2022**

**B.Tech. INFORMATION TECHNOLOGY**

**CHOICE BASED CREDIT SYSTEM**

**PROGRAM EDUCATIONAL OBJECTIVES (PEOs)**

- I. The graduates of the Information Technology program will demonstrate themselves as leading professionals.
- II. The graduates of the Information Technology program will be equipped with the necessary skills to become proficient researchers.
- III. The graduates of the Information Technology program will demonstrate their abilities as successful entrepreneurs.
- IV. The graduates of the Information Technology program will excel in higher studies or modern administrative services.

**PROGRAM OUTCOMES(POs)**

**PO GRADUATE ATTRIBUTES**

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

#### PROGRAM SPECIFIC OUTCOMES(PSOs)

13. Exhibit proficiency in examining standard business operations in order to create and implement suitable Information Technology solutions.
14. Demonstrate the ability to establish an IT infrastructure, effectively manage resources and ensure data security.

#### PEO's-PO's & PSO's MAPPING: (Example)

POs	PEOs			
	I	II	III	IV
1.	✓	✓	✓	
2.	✓	✓	✓	
3.	✓	✓	✓	✓
4.	✓	✓	✓	
5.			✓	✓
6.	✓	✓		
7.	✓	✓		
8.				✓
9.	✓	✓	✓	✓
10.	✓	✓		✓
11.			✓	✓
12.			✓	✓
13.	✓	✓	✓	✓
14.	✓	✓	✓	✓

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**B.Tech. INFORMATION TECHNOLOGY**

**CURRICULUM FOR SEMESTERS I TO II AND SYLLABI FOR  
SEMESTERS I AND II**

**SEMESTER I**

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY#	PERIODS PER WEEK				TOTAL Hours	Prerequisite	Position
				L	T	P	C			
1.	IP22151	Induction Program (Common to All)	-	-	-	-	0	-	-	-
<b>Theory Subjects</b>										
2.	HS22151	Tamil Language and Heritage of Ancient Tamil Society (Common to All Branches)	HS	1	0	0	1	1	-	F
3.	HS22152	Communicative English (Common to All Branches)	HS	3	0	0	3	3	-	F
4.	MA22151	Applied Mathematics I (Common to All Branches Except MR)	BS	3	1	0	4	4	-	F
5.	PH22151	Applied Physics (Common to AD/CS/EC/EE/IT)	BS	3	0	0	3	3	-	F
6.	CY22151	Applied Chemistry (Common to AD/CS/EC/EE/IT)	BS	3	0	0	3	3	-	F
7.	EE22151	Basic Electrical and Electronics Engineering (Common to All Branches except CH/EE/EC)	ES	3	0	0	3	3	-	F
8.	IT22101	Programming for Problem Solving (Common to IT/AD/CS/EE/EC)	ES	3	0	0	3	3	-	F
<b>Practical Subjects</b>										
8.	PH22161	Physics Laboratory (Common to All Branches except BT)	BS	0	0	2	1	2	-	F
9.	EE22111	Basic Electrical and Electronics Engineering Laboratory (Common to All Branches except EC)	ES	0	0	2	1	2	-	F
10.	IT22111	Programming for Problem Solving Laboratory (Common to IT/AD/CS/EE/EC)	ES	0	0	3	1.5	3	-	F
<b>Total</b>				<b>19</b>	<b>1</b>	<b>7</b>	<b>23.5</b>	<b>27</b>		

**SEMESTER II**

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY <sup>#</sup>	PERIODS PER WEEK				TOTAL Hours	Prerequisite	Position
				L	T	P	C			
<b>Theory Subjects</b>										
1.	HS22251	Science and Technology in Ancient Tamil Society (Common to All)	HS	2	0	0	2	2	-	F
2.	HS22252	Technical English (Common to All)	HS	3	0	0	3	3	-	F
3.	MA22251	Applied Mathematics II (Common to All Except MR)	BS	3	1	0	4	4	-	F
4.	ME22251	Technical Drawing (Common to AD /CS/IT)	ES	1	0	2	2	3	-	F
5.	IT22201	Computer Organization and Architecture	PC	3	0	0	3	3	-	F
6.	IT22202	OOPS using C++ and Python	PC	3	0	0	3	3	-	F
7.	BT22101	Biology for Engineers (Common to BT/AE/IT)	BS	3	0	0	3	3	-	F
<b>Practical Subjects</b>										
8.	IT22211	Hardware Assembling and Software Tools Laboratory	ES	0	0	3	1.5	3	-	F
9.	IT22212	OOPS using C++ and Python Laboratory	PC	0	0	3	1.5	3	-	F
<b>Total</b>				<b>18</b>	<b>1</b>	<b>8</b>	<b>23</b>	<b>27</b>		

Semester III										
S. No	Course Code	Course Title	Category	Contact Periods	L	T	P	C	Pre requisite	F/M
<b>THEORY</b>										
1	MA22353	Discrete Mathematics (Common to CS & IT)		4	3	1	0	4	-	F
2	IT22301	Data Structures and Algorithms		3	3	0	0	3	-	F
3	IT22302	Database Concepts		3	3	0	0	3	-	F
4	IT22303	Digital Communication		3	3	0	0	3	-	F
5	IT22309	IT Essentials: Theory and Practices		4	2	0	2	3	-	F
<b>PRACTICAL</b>										
6	IT22311	Data Structures and Algorithms Laboratory		3	0	0	3	1.5	-	F
7	IT22312	Database Concepts Laboratory		3	0	0	3	1.5	-	F
8	IT22313	Digital Communication Laboratory		3	0	0	3	1.5	-	F
			<b>TOTAL</b>	<b>26</b>	<b>14</b>	<b>1</b>	<b>11</b>	<b>20.5</b>		

**SEMESTER IV**

SL. NO.	COURSE CODE	COURSE TITLE	CATEGORY <sup>#</sup>	PERIODS PER WEEK				TOTAL Hours	Prerequisite	Position
				L	T	P	C			
<b>Theory Subjects</b>										
1.	MA22454	Probability and Queuing Theory (Common to CS & IT)	BS	3	1	0	4	4	-	F
2.	GE22451	Environmental Sciences and Sustainability (Common to All Branches)	BS	3	0	0	3	3	-	F
3.	IT22401	Operating System Concepts	PC	3	0	0	3	3	-	F
4.	IT22402	Microprocessor and Microcontroller Interfacing	ES	3	0	0	3	3	-	F
5.	IT22408	Paradigms of Algorithm Design: Theory and Practices	PC	2	0	2	3	4	-	F
6.	IT22409	Software Engineering Methodologies: Theory and Practices	PC	2	0	2	3	4	-	F
<b>Practical Subjects</b>										
8.	IT22411	Microprocessor and Microcontroller Interfacing Laboratory	ES	0	0	3	1.5	3	-	F
9.	IT22412	Operating System Concepts Laboratory	PC	0	0	3	1.5	3	-	F
<b>Total</b>				<b>16</b>	<b>1</b>	<b>10</b>	<b>22</b>	<b>27</b>		

HS22151

தமிழ் மொழியும் தமிழர் மரபும்  
TAMIL LANGUAGE AND HERITAGE OF  
TAMILS

(Common to all Branches)

L	T	P	C
1	0	0	1

பாடத்தின்நோக்கங்கள் :

- தமிழ் மொழியின் தோற்றம் பற்றியும், திணை கருத்துக்கள் வாயிலாக வாழ்வியல் முறைகளை பற்றியும் கற்றுக் கொள்வார்கள்.
- இந்திய தேசிய சுதந்திர இயக்கத்தில் தமிழர்களின் பங்களிப்பு மற்றும் தமிழர்களின் மேலாண்மை முறைகளை பற்றியும் கற்றுக் கொள்வார்கள்.

**OBJECTIVES:**

- They will learn about the origin of the Tamil language and the ways of life through five types of lands.
- They will also learn about the contribution of Tamils in the Indian National Freedom Movement and the management methods of Tamils.

**அலகு 1 தமிழுக்கும் தொழில்நுட்பக் கல்விக்கும் உள்ள தொடர்பு 3**  
மொழி மற்றும் பாரம்பரியம்: இந்தியாவில் உள்ள மொழிக் குடும்பங்கள் – திராவிட மொழிகள் – தமிழ் ஒரு செம்மொழி – தமிழில் செம்மொழி இலக்கியம் - உ.வே. சாமிநாதய்யர். ஆறுமுகநாவலர் ஆகியோரின் பங்களிப்பு – தொழில் நுட்பக் கல்வியில் தமிழ் மொழியின் முக்கியத்துவம்.

**UNIT I LANGUAGE AND HERITAGE**

**Language families in India** – Dravidan Languages – Tamil as a Classical language – Classical Literature in Tamil – Contribution of U. Ve. Saminathaiyar. Arumuka Navalar – Importance of Tamil language in technical education.

**அலகு 2 திணை கருத்துக்கள் 9**  
திணை கருத்துக்கள்: -ஐந்து வகை நிலங்கள், விலங்குகள், கடவுள்கள், தொழில், வாழ்க்கை முறைகள், இசை, நடனம், உணவு முறை, தமிழர்களின் தாவரங்கள் மற்றும் விலங்கினங்கள் – தொல்காப்பியம் மற்றும் சங்க இலக்கியங்களில் இருந்து அகம் மற்றும் புரம் கருத்து – தமிழ் பற்றிய அறம் கருத்து – கல்வி மற்றும் எழுத்தறிவு சங்க காலம் – சங்ககாலத்தின் பண்டைய நகரங்கள் மற்றும் துறைமுகங்கள் – சங்க காலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி – சோழர்களின் வெளிநாட்டு வெற்றி.

**UNIT II THINAI CONCEPTS**

Five types of lands, animals, Gods, occupation, life styles, music, dance , food style, Floara and Fauna of Tamils - Agam and puram concept from Tholkappiyam and Sangam Literature – Aram concept of Tamil – Education and Literacy during Sangam Age – Ancient cities and Ports of Sangam Age – Export and Import during Sangam Age - Overseas Conquest of Choloas.



### அலகு 3 தமிழரின் மரபு

3

இந்திய தேசிய சுதந்திர இயக்கம் மற்றும் இந்திய கலாச்சாரத்திற்கு தமிழர்களின் பங்களிப்பு:- சுப்ரமணிய பாரதி, வாஞ்சிநாதன், சுப்பிரமணிய சிவா, வீரபாண்டிய கட்ட பொம்மன், வா..ஊ சிதம்பரம் பிள்ளை, தீரன் சின்னமலை, மருது பாண்டிய சகோதரர்கள், பூலி தேவர், திருப்பூர் குமரன், வீரமங்கை வேலு நாச்சியார் - .தமிழர் இலக்கியங்களில் மேலாண்மை கருத்துக்கள் (கி. மு. 500 முதல் கி. பி 200 வரை) – அகநானூறு, புறநானூறு, திருக்குறள் ஆகியவற்றில் மேலாண்மைக் கருத்துக்கள்.

### UNIT -3 HERITAGE OF TAMILS

**Contribution of Tamils to Indian National Freedom Movement and Indian Culture:** Contributions of Subramanya Bharathi, Vanchinathan, Subramaniya Siva, Veerapandiya Kattabomman, V O Chidambaram Pillai, Dheeran Chinnamalai, The Maruthu Pandiyar, Puli Thevar, Tiruppur Kumaran, Veera Mangai Velunachiyar.

**TOTAL : 15 PERIODS**

பாடநெறி முடிவுகள் :

**OUTCOMES:**

CO	CO statements Upon successful completion of the course, the students should be able to	RBT Level
CO1	மாணவர்கள் தமிழ் மொழித் தோற்றம் பற்றித் தெரிந்து கொள்வார்கள். Students will learn about the origin of the Tamil language	1
CO2	தமிழர்களின் வாழ்வியல் முறைகளைத் தெரிந்து கொள்வார்கள். They will know the ways of life of Tamils.	2
CO3	தமிழர்களின் சுதந்திர போராட்ட வீரர்களை பற்றியும், மேலாண்மைகளை பற்றியும் தெரிந்து கொள்வார்கள். They will know about the freedom fighters of Tamils and the management of Tamils	2

1- Remember, 2- Understand, 3- Apply, 4- Analyse, 5- Evaluate, 6- Create

பாடநூல்கள்:

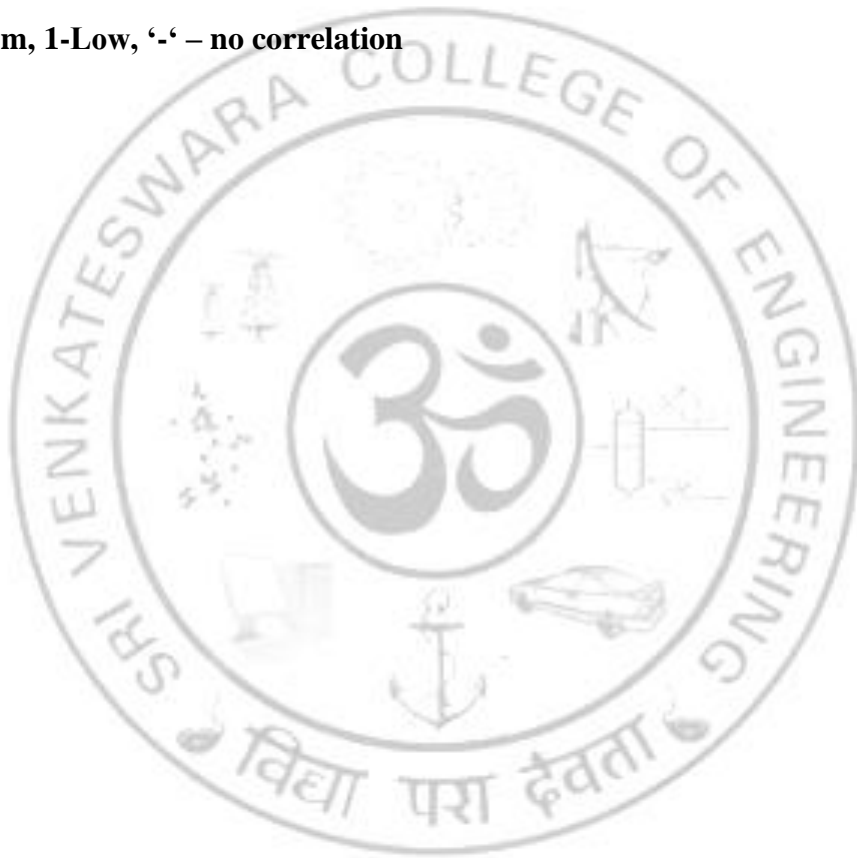
**REFERNCES:**

1. பொன். முத்துகுமாரன் (2002), “தமிழ் மரபு”, காந்தளகம், 68, அண்ணா சாலை, சென்னை 600 002
2. பி. டிஹீனிவாச ஐயங்கார் (தமிழக்கமும் திறனாய்வும்) புலவர் கா. கோவிந்தன் (1988), “தமிழர் வரலாறு (முதல் பகுதி)”, திருநெல்வேலி தென்னிந்திய சைவ சித்தாந்த நூற்பதிப்பு கழகம் ,154, TTK சாலை, சென்னை 18.
3. டாக்டர். கே. கே. பிள்ளை (2009), “தமிழக வரலாறு மக்களும் பண்பாடும்”, உலக தமிழாராய்ச்சி நிறுவனம், தரமணி, சென்னை 600113
4. முனைவர். ச. இராஜேந்திரன் (2004), “தமிழில் சொல்லாக்கம்”, தஞ்சாவூர் தமிழ் பல்கலைக் கழகம் வெளியீடு

**COURSE ARTICULATION MATRIX:**

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	-	-	3	-	3	3	2	-	3	3	-	2	-	-
2	-	-	3	2	3	3	-	1	3	3	-	-	-	-
3	-	-	3	2	3	3	2	-	3	3	-	2	-	-

3-High, 2-Medium, 1-Low, '-' – no correlation



**HS22152**

**COMMUNICATIVE ENGLISH**  
(Common to All Branches)

**L T P C**  
**3 0 0 3**

**COURSE OBJECTIVES:**

1. Enable learners to interact fluently on everyday social contexts.
2. Train learners to engage in conversations in an academic/scholarly setting.
3. Instil confidence in learners to overcome public speaking barriers.
4. Develop learners' ability to take notes and in the process, improve their listening skills.
5. Enhance learners' reading skill through reading text passages for comprehension and contemplation.
6. Improve learners' skills to write on topics of general interest and drafting correspondences for general purposes.

**UNIT I**

**9**

Listening - short video clips - conversational scenes from movies, celebrities' speeches /interviews. Speaking - several ways of introducing oneself at several situations, introducing others at several situations, inviting people for several occasions, describing people and their places. Reading - short comprehension passages - making inferences, critical analysis. Writing - completing the incomplete sentences - developing hints from the given information. Grammar - Wh-Questions and Yes or No questions - Parts of speech. Vocabulary development - prefixes - suffixes - articles - countable / uncountable nouns.

**UNIT II**

**9**

Listening - customer care voice files, short narratives - identifying problems and developing telephone etiquettes. Speaking - speaking over skype/ whatsapp, making business calls, making self-recorded informative videos, inquiring about a concept/activity, describing a concept/activity. Reading - reading the headlines on news magazines - slogans and taglines from advertisements. Writing - free writing - writing - headlines, slogans and taglines individual inspirations. Grammar- conjunctions, idioms, phrases, quotes. Vocabulary development - guessing the meanings of words in different contexts.

**UNIT III**

**9**

Listening - courtroom scenes from movies, debates and talks from news channels, notes taking. Speaking - language and tone for arguments, discussion, deliberation, contemplation, expressing opinions, reacting to different situations in an alien country. Reading - language used in instruction manuals of household appliances, cookery and other basic instructions. Writing- understanding the structure of texts - use of reference words, discourse markers- coherence, rearranging the jumbled sentences. Grammar - adjectives - degrees of comparison, framing direct and indirect questions. Vocabulary development - concise approach, single word substitution.

**UNIT IV**

**9**

Listening - Sports commentaries, advertisements with users' criticisms; Speaking - for social causes, for promoting a concept, negotiating and bargaining; Reading - review of a product, movie, movement or a system; Writing - writing for advertisements, selling a product; Grammar

– Tenses - Simple Past, Present and Future, Continuous - Past, Present and Future; Vocabulary Development - synonyms, antonyms and phrasal verbs.

## UNIT V

9

Listening - video lectures, video demonstration of a concept; Speaking – presenting papers/concepts, delivering short speeches, discourses on health, suggesting natural home remedies, cleanliness, civic sense and responsibilities; Reading - columns and articles on home science; Writing - correspondences of requests, basic enquiry/observation and basic complaints; Grammar - modal verbs, perfect tenses - Vocabulary development - collocations.

**TOTAL: 45 PERIODS**

## REFERENCES:

1. Department of English, Anna University, Mindscapes : English for Technologists and Engineers. Orient Black Swan, Chennai, 2017.
2. Downes and Colm, & quot;Cambridge English for Job-hunting&quot;, Cambridge University Press, New Delhi, 2008.
3. Murphy and Raymond, & quot;Intermediate English Grammar with Answers&quot;, Cambridge University Press, 2000.
4. Thomson, A.J., & quot;Practical English Grammar 1 & amp; 2&quot;, Oxford, 1986.

## Websites

1. <http://www.usingenglish.com>
2. <http://www.uefap.com3>
3. <https://owl.english.purdue.edu/owl/>
4. [www.learnenglishfeelgood.com/esl-printables-worksheets.html](http://www.learnenglishfeelgood.com/esl-printables-worksheets.html)

## Software

1. Face 2 Face Advance – Cambridge University Press, 2014.
2. English Advance Vocabulary- Cambridge University Press.
3. IELTS test preparation – Cambridge University Press 2017.
4. Official Guide to the TOEFL Test With CD-ROM, 4<sup>th</sup> Edition.
5. Cambridge Preparation for the TOEFL TEST- Cambridge University Press, 2017.

## OUTCOMES:

Upon successful completion of the course, the students should be able to

SL.NO	STATEMENT	RBT LEVEL
CO1	Acquire adequate vocabulary for effective communication	AP
CO2	Listen to formal and informal communication and read articles and infer meanings from specific contexts from magazines and news papers.	AP
CO3	Participate effectively in informal/casual conversations; introduce themselves and their friends and express opinions in English.	AN

CO4	Comprehend conversations and short talks delivered in English.	C
CO5	Write short write-ups and personal letters and emails in English	C

### COURSE ARTICULATION MATRIX

CO	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.										3				
2.										3				
3.										3				
4.										3				
5.										3				



MA22151

**Applied Mathematics I**  
**(Common to all Branches except MR)**

**L T P C**  
**3 1 0 4**

**COURSE OBJECTIVES:**

The Student should be made to:

1. Compute eigen values and eigen vectors and use in diagonalization and in classifying real quadratic forms.
2. Study differential calculus and its applications to relevant Engineering problems.
3. Compute derivatives using the chain rule or total differentials.
4. Understand the rotation of two dimensional geometry using definite integrals.
5. Acquaint with the Mathematical tools needed in evaluating multiple integrals and their usage.

**UNIT I MATRICES (9+3)**

Eigen values and Eigen vectors of a real matrix – Characteristic equation – Properties of Eigen values and Eigen vectors – Statement and Applications of Cayley-Hamilton Theorem – Diagonalization of matrices– Reduction of a quadratic form into canonical form by orthogonal transformation-Nature of quadratic forms.

**UNIT II APPLICATION OF DIFFERENTIAL CALCULUS (9+3)**

Curvature and radius of Curvature– Centre curvature – Circle of curvature –Evolutes– Envelopes- Evolute as Envelope of Normals.

**UNIT III DIFFERENTIAL CALCULUS FOR SEVERAL VARIABLES (9+3)**

Limits and Continuity - Partial derivatives – Total derivatives – Differentiation of implicit functions – Jacobians and properties– Taylor’s series for functions of two variables – Maxima and Minima of functions of two variables –Lagrange’s method of undetermined multipliers.

**UNIT IV APPLICATION OF DEFINITE INTEGRALS (9+3)**

Integration by Parts-Bernoulli’s formula for integration- Definite integrals and its Properties- Solids of Revolution- Disk Method- Washer Method- Rotation about both x and y axis and Shell method.

**UNIT V MULTIPLE INTEGRALS (9+3)**

Double integrals in Cartesian and polar coordinates – Change of order of integration – Area enclosed by plane curves - Change of variables in double integrals – Triple integrals –

Volume of solids.

**TOTAL (L:45+T:15): 60 PERIODS**

**TEXTBOOKS:**

1. Erwin Kreyszing, Herbert Kreyszing, Edward Norminton, “Advanced Engineering Mathematics”, 10<sup>th</sup> Edition, John Wiley, (2015)
2. Grewal .B.S, Grewal .J.S “Higher Engineering Mathematics”,43<sup>rd</sup> Edition, Khanna Publications, Delhi, (2015).

**REFERENCES:**

1. Bali N.P and Manish Goyal, “A Text book of Engineering Mathematics”, Ninth Edition, Laxmi Publications Pvt. Ltd.,(2014).
2. Glyn James, “Advanced Modern Engineering Mathematics”, 4<sup>th</sup> Edition, Pearson Education,(2016).
3. Ramana B.V, “Higher Engineering Mathematics”, Tata McGraw Hill Publishing Company, New Delhi, (2013).

**Web Link:**

1. <https://home.iitk.ac.in/~peeyush/102A/Lecture-notes.pdf>
2. <https://www.sydney.edu.au/content/dam/students/documents/mathematics-learning-entre/integration-definite-integral.pdf>

**COURSE OUTCOMES:**

Course Outcomes	Upon completion of the course, students will be able to:	RBT* Level
CO1	Solve the Eigen value problems in matrices.	AP
CO2	Apply the basic notion of calculus in Engineering problems and to tackle for different geometries.	AP
CO3	Perform calculus for more than one variable and its applications in Engineering problems.	AP
CO4	Apply definite integrals for design of three dimensional components.	AP
CO5	Evaluate multiple integral in Cartesian and polar coordinates.	AP

**COURSE ARTICULATION MATRIX**

CO	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.	3	3	3	3								3		
2.	3	3										3		
3.	3	3	3	3								3		
4.	3	3										3		

5.	3	3	2	2								3		
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**PH22151**

**Applied Physics**  
(Common to AD, CS, EE, EC, IT)

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OBJECTIVES:**

- To enhance the fundamental knowledge in Physics and its applications relevant to various Streams of Engineering and Technology.

**UNIT-I: LASERS AND FIBER OPTICS**

**9**

Lasers: population of energy levels, Einstein's A and B coefficients derivation – resonant cavity, optical amplification (qualitative) – Nd-YAG laser – CO<sub>2</sub> Laser – Exceimer Laser – Applications. Fiber optics: principle, numerical aperture and acceptance angle - types of optical fibres (material, refractive index, and mode) – losses associated with optical fibers–Fiber optic communication - fibre optic sensors: pressure and displacement - Endoscope.

**UNIT-II: QUANTUM PHYSICS**

**9**

Black body radiation – Planck's theory (derivation)- deduction of Wien's and Rayleigh Jean's law – Compton effect: theory and experimental verification – wave particle duality – electron diffraction – concept of wave function and its physical significance – Schrödinger's wave equation – time independent and time dependent wave equations – particle in a one-dimensional - three dimensional potential box–Fermi distribution function – Effect of temperature on Fermi Function – Density of energy states – carrier concentration in metals.

**UNIT III: CRYSTAL PHYSICS**

**9**

Single crystalline, polycrystalline and amorphous materials – single crystals: unit cell, crystal systems, Bravais lattices, directions and planes in a crystal, Miller indices – interplanar distances- coordination number and packing factor for SC, BCC, FCC, HCP and Diamond structure (qualitative) - crystal imperfections: point defects, line defects – Burger vectors, stacking faults

**UNIT IV WAVES AND OSCILLATIONS**

**9**

Travelling waves, Wave equation for string ,Energy and momentum , Resonance Superposition & Reflection, Standing waves, Harmonic oscillations, Damped harmonic motion- Forced oscillations, amplitude resonance - Expression for Resonant frequency, Electrical analogy of mechanical oscillations, Quality factor and sharpness of resonance, Electrical analogy of mechanical oscillators.

**UNIT V ELECTROMAGNETIC WAVES**

**9**

Maxwell's Equations. Vector and Scalar Potentials. Plane waves in Dielectric media. Poynting Theorem and Poynting Vector.- Electromagnetic (EM) Energy Density. Physical Concept of Electromagnetic Field Energy Density, EM Wave Propagation in Unbounded Media , Plane EM waves through vacuum and isotropic dielectric medium, transverse nature of plane EM waves, refractive index and dielectric constant.

**TEXT BOOKS:**

- Gaur R.K., Gupta S.L, "Engineering Physics", Dhanput Publications, 2015.



2. Shatendra Sharma, Jyotsna Sharma, "Engineering Physics", Pearson, 2006.
- 3 Rajendran V, "Engineering Physics", Tata McGraw Hill, 2009.
- 4 Arumugam M, "Materials Science", Anuradha Publications, 2015.

#### REFERENCES:

1. David Halliday, Robert Resnick, Jearl Walker, "Principles of Physics", 10th Edition, Wiley, 2015.
2. Peter Atkins, Julio De Paula, "Physical Chemistry", 10th Edition., Oxford University Press, 2014.
3. Arthur Beiser, Shobhit Mahajan, Rai Choudhury S, "Concepts of Modern Physics", 7<sup>th</sup> Edition, McGraw Hill Education, 2017.
4. Raghavan V, "Materials Science and Engineering", PHI Learning Pvt. Ltd., 2010

#### Course outcomes

Course Outcomes	Upon completion of the course, students will be able to:	RBT* Level
CO 1	Develop an understanding about photonics and Fiber Optic communication system	U
CO 2	Acquire the knowledge of Quantum mechanics	AP
CO 3	Classify and demonstrate the fundamentals of crystals and their defects.	AP
CO 4	Gain knowledge in waves and oscillations	U
CO 5	Enable to explore the theory of electromagnetic waves and its propagation	AP

#### COURSE ARTICULATION MATRIX

COs	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.	3				2	2				1				
2.	3	3	2	2	2	2				1		2		
3.	3									1				
4.	3		2							1				
5.	3	3	2	2	2					1		2		

CY22151

**Applied Chemistry**  
(Common to AD, CS, EC, EE & IT)

**L T P C**  
**3 0 0 3**

**OBJECTIVES:**

- To make the students conversant with basic electrochemistry and batteries.
- To develop an understanding of the laws of photochemistry and basics.
- To acquaint the students with the basics of nanomaterials, their properties and uses.
- To acquire the basic knowledge on sensors which are essential for the software engineers for develop new devices.
- To enable the students to understand the types of instruments for material analysis and their working principle.

**UNIT I ELECTROCHEMISTRY 9**

Electrodes and electrochemical cells – electrode potential, standard electrode potential, single electrode potential and its determination, types of electrodes – calomel, quinhydrone and glass electrode. Nernst equation - Determination of pH of a solution by using quinhydrone and glass electrode. Electrochemical series and its applications. Batteries – Primary (dry cell) and secondary batteries (Lead – acid storage battery and Lithium ion battery) and next generation batteries

**UNIT II PHOTOCHEMISTRY 9**

Laws of photochemistry – Grotthuss-Draper law, Stark–Einstein law and Lambert Beer Law – determination iron by spectrophotometer. Quantum efficiency – Photo processes - internal conversion, inter-system crossing, fluorescence, phosphorescence and photo-sensitization-quenching of fluorescence and its kinetics, Stern-Volmer relationship. Applications of photochemistry.

**UNIT III NANOCHEMISTRY 9**

Basics and scale of nanotechnology, different classes of nanomaterials, Distinction between molecules, nanoparticles and bulk materials; size-dependent properties. Synthesis of nanomaterials, fabrication (lithography) and its applications – Basics of nanophotonics and quantum confined materials (surface plasmon resonance).

**UNIT IV CHEMICAL SENSOR 9**

Sensors, sensor science and technology, types of sensors. Chemical Sensors – characteristics and elements. Electrochemical sensors – voltammetry, potentiometric sensors, amperometric sensors, polarization techniques.

**UNIT V INSTRUMENTATION TECHNIQUES 9**

Treatment of analytical data, including error analysis. Classification of analytical methods and the types of instrumental method - Electromagnetic radiation-UV-visible and IR spectroscopy: principles, instrumentation (Block diagram only) and applications. Separation techniques chromatography: Gas chromatography, liquid chromatography - importance of column technology (packing, capillaries), separation based on increasing number of factor (volatility, solubility, interactions with stationary phase, size)

**TOTAL (L: 45): 45 PERIODS**

**TEXT BOOKS:**

1. Jain P.C. and Monica Jain, “Engineering Chemistry”, Dhanpat Rai Publishing Company (P) Ltd., New Delhi, 2010.

- Dara S.S, Umare S.S, "Engineering Chemistry", S. Chand & Company Ltd., New Delhi 2010
- B.K.Sharma, "Instrumental Methods of Chemical Analysis", 28th Edition, Goel Publishing House, 2012.
- Skoog, D.A. Holler F.J. & Nieman, T.A. Principles of Instrumental Analysis, Cengage Learning India Ed.

**REFERENCES:**

- Ozin G. A. and Arsenault A. C., "Nanochemistry: A Chemical Approach to Nanomaterials", RSC Publishing, 2005.
- B.R. Puri, L.R. Sharma, M.S. Pathania., "Principles of Physical Chemistry" Vishal Publishing Company, 2008.
- John Vetelino, Aravind Reghu, Introduction to Sensors , Taylor & Francis Group, CRC Press, 1<sup>st</sup> edition, 2010.
- Peter Gründler, Chemical Sensors, An Introduction for Scientists and Engineers, Springer-Verlag Berlin Heidelberg 2007.

<b>COURSE OUTCOMES:</b> On the successful completion of the course, students will be able to		<b>RBT* Level</b>
1	Identify electrochemical cells, corrosion and fundamental aspects of batteries	U
2	Interpret the photochemical reactions and make use of spectroscopic techniques	U
3	Realize the structures, properties and applications of nanoparticles.	U
4	Acquire the basic knowledge on chemical sensors to develop an interdisciplinary approach among the students which are essential for the software engineers	U
5	Develop a theoretical principles of UV-visible and IR spectroscopy and separation techniques	AP

**Mapping CO – PO – PSO \***

COs	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.	3	3	3	2								3		
2.	3	3				3	3					3		
3.	3	3	3			3	3	1				3		
4.	3	3	3		1	3	3					3		
5.	3	3		2		3	3					3		

**EE22151**

**BASIC ELECTRICAL AND ELECTRONICS  
ENGINEERING**

**L T P C**

**3 0 0 3**

**COURSE OBJECTIVES:**

1. To understand the basic theorems used in Electrical circuits.
2. To educate on the different concepts and functions of electrical machines.
3. To introduce electron devices and its applications.
4. To explain the principles of digital electronics.
5. To impart knowledge on the principles of measuring instruments.

**UNIT I ELECTRICAL CIRCUITS 9**

Ohm's Law – Kirchhoff's Laws - Steady State Solution of DC Circuits using Mesh and Nodal Analysis - Introduction to AC Circuits - Waveforms and RMS Value - Power and Power factor - Single Phase and Three Phase AC Balanced Circuits.

**UNIT II ELECTRICAL MACHINES 9**

Construction, Principle of Operation, Basic Equations and Applications of DC Generators, DC Motors, Single phase induction Motor, Single Phase Transformer.

**UNIT III SEMICONDUCTOR DEVICES AND APPLICATIONS 9**

Characteristics of PN Junction Diode - Zener Effect - Zener Diode - LED, Photo diode and its Characteristics - Half Wave and Full Wave Rectifiers - Voltage Regulation. Bipolar Junction Transistor - Common Emitter Configuration, Characteristics and CE as an Amplifier - Photo transistors.

**UNIT IV DIGITAL ELECTRONICS 9**

Number System Conversion Methods – Simplification of Boolean Expression using K-Map – Half and Full Adders – Flip-Flops – Shift Registers - SISO, SIPO, PISO, PIPO and 4-bit Synchronous and Asynchronous UP Counters.

**UNIT V MEASURING INSTRUMENTS 9**

Types of Signals: Analog and Digital Signals - Construction and working Principle of Moving Moving Iron Instruments (Ammeters and Voltmeters), Dynamometer type Watt meters and meters. Instrumentation Amplifier, – R-2R ladder Type D/A Converter - Flash Type and S Approximation Type A/D Converter.

**TOTAL: 45 PERIODS**

**TEXT BOOKS:**

1. Kothari DP and I.J Nagrath, "Basic Electrical and Electronics Engineering", Second Edition, McGraw Hill Education, 2020.

- Sedha. R.S., "A Text Book of Applied Electronics", S.Chand & Co., 2014.

### REFERENCES:

- Muthusubramanian R, Salivahanan S and Muraleedharan K A, "Basic Electrical, Electronics Engineering", Tata McGraw Hill, 2013.
- Mehta VK, "Principles of Electronics", S. Chand & Company Ltd, 2010.
- M. Morris Mano, "Digital Logic & Computer Engineering", Prentice Hall of India, 2004.
- Mahmood Nahvi and Joseph A.Edminister, "Electric Circuits", Schaum' Outline Series, McGraw Hill, Fourth Edition, 2007.

### COURSE OUTCOMES

SL.NO	STATEMENT	RBT LEVEL
CO1.	Compute the electric circuit parameters for simple problems	AN
CO2.	Understand the construction and characteristics of different electrical machines.	AN
CO3.	Describe the fundamental behavior of different semiconductor devices and circuits.	AN
CO4.	Design basic digital circuits using Logic Gates and Flip-Flops.	AN
CO5.	Analyze the operating principle and working of measuring instruments.	AN

### COURSE ARTICULATION MATRIX

COs	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.	3	3	3	3			2					2		
2.	3	3	3	3			2					2		
3.	3	3	3	3			2					2		
4.	3	3	3	3			2					2		
5.	3	3	3	3			2					2		

<b>IT22101</b>	<b>Programming for Problem Solving (Common to IT, AD, CS, EE, EC)</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Objectives:**

- Learn the organization of a digital computer.
- Learn to think logically and write algorithms or draw flow charts for problems.
- Be exposed to the syntax of C.
- Be familiar with programming in C.
- Learn to use arrays, strings, functions, pointers, structures and unions in C.

**UNIT - 1 INTRODUCTION TO PROBLEM SOLVING 6**  
 Simple model of a Computer – Hardware – Software – Data Representation, Introduction to Computer Networks and Internet, Problem Solving Techniques – Bottom up design and top down design - applications, Introduction to Algorithms and Flow Chart

Suggested Activities:

Case study – Understanding the analysis and design of the Student Management System (SMS).

**UNIT - 2 C PROGRAMMING BASICS 12**  
 Introduction to ‘C’ programming – structure of a ‘C’ program – Conversion of simple algorithm to program. Constants, Variables – Data Types – Expressions using operators in ‘C’ – Managing Input and Output operations – Decision Making and Branching – Looping statements – solving simple scientific and statistical problems.

Suggested Activities

Case study: Dataset creation and Grade calculation in SMS.

**UNIT - 3 ARRAYS AND STRINGS 9**  
 Array: declaration, initialization. Multi dimensional arrays. Strings: Strings vs Character arrays, string operations

Suggested Activities - Grade sheet generation in SMS

**UNIT - 4 FUNCTIONS AND STRUCTURES 9**  
 Need for Modular programming, Functions: definition, call, arguments, call by value. Call by reference, Recursion. structures and unions: Need, declaration, Accessing Structure elements, Arrays of structures

Suggested Activities: Redesigning SMS in terms of modules

**UNIT - 5 POINTERS AND FILE HANDLING IN C 9**  
 Pointers : Introduction, pointers to primitive data types, pointers to user defined data types: arrays and structures, array of pointers, Dynamic Memory Allocation. Files: Read/Write of binary and text files. Preprocessor directives

Suggested Activities: Mange I/O in SMS using Files

**Total (L:45 Periods)**

**OUTCOMES:**

Upon successful completion of the course, the students should be able to

CO#	STATEMENT	RBT LEVEL
1	Identify input and output from the real word problem scenarios.	AP
2	Represent the design flow using Flow-charts and application logic using pseudo code.	AP
3	Apply appropriate programming constructs to implement a given design using C.	AP
4	Debug and customize an existing software developed in C.	E
5	Develop a modularised software application In C for the given user requirements	C

**TEXT BOOKS:**

1. Pradip Dey, Manas Ghosh, “Programming in C”, First Edition, Oxford University Press, 2018.
2. R G Dromey, “How to Solve it using Computer”, Pearson,2006.

**REFERENCES:**

1. Kernighan,B. W and Ritchie,D.M, “The C Programming language”, Second Edition, Pearson Education, 2015.
2. Yashavant P. Kanetkar. “Let Us C”, BPB Publications, 2011.
3. Byron S Gottfried, “Programming with C”, Schaum’s Outlines, Third Edition, Tata McGrawHill, 2010.
4. Reema Thareja, “Programming in C”, 2nd ed., Oxford University Press, 2016.

**COURSE ARTICULATION MATRIX**

COs	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.	1	3						2	3			2	2	2
2.	1	3						2	3			2	2	2
3.	1		3	2	1			2	3			2	2	2
4.	1		3	2	1			2	3			2	2	2
5.	1		3	2	1			2	3			2	3	3

PH22161

**Physics Laboratory**  
**(Common to all Branches except BT)**

L	T	P	C
0	0	2	1

**OBJECTIVES:**

To introduce different experiments to test basic understanding of physics concepts applied in optics, thermal physics and properties of matter.

**LIST OF EXPERIMENTS: ( Any EIGHT Experiments)**

1. a) Determination of Wavelength, and particle size using Laser.  
b) Determination of acceptance angle in an optical fiber.
2. Determination of velocity of sound and compressibility of liquid – Ultrasonic Interferometer.
3. Determination of wavelength of mercury spectrum – spectrometer grating.
4. Determination of thermal conductivity of a bad conductor – Lee’s Disc method.
5. Determination of Young’s modulus by Non uniform bending method.
6. Determination of specific resistance of a given coil of wire – Carey Foster’s Bridge.
7. Determination of Rigidity modulus of a given wire -Torsional Pendulum
8. Energy band gap of a Semiconductor
9. Determine the Hysteresis loss of a given Specimen
10. Calibration of Voltmeter & Ammeter using potentiometer.

**OUTCOMES:**

The hands on exercises undergone by the students will help them to apply physics principles of, optics and thermal physics to evaluate engineering properties of materials.

**REFERENCES:**

1. "Physics Laboratory practical manual", 1<sup>st</sup> Revised Edition by Faculty members, 2018.

**Course outcomes**

CO#	STATEMENT	RBT LEVEL
CO 1	Analyze the physical principle involved in the various instruments; also relate the principle to new application.	AN
CO 2	Comprehend the Experiments in the areas of optics, mechanics and thermal physics to nurture the concepts in all branches of Engineering.	AP
CO 3	Apply the basic concepts of Physical Science to think innovatively and also improve the creative skills that are essential for engineering.	AP
CO 4	Evaluate the process and outcomes of an experiment quantitatively and qualitatively	AP
CO 5	Extend the scope of an investigation whether or not results come out as expected	AP



**COURSE ARTICULATION MATRIX**

COs	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.	3	3	2	3	2				3	1		2		
2.	3	3		3		2			3	1		2		
3.	3	3	2	3	2	2			3	1		2		
4.	3	3		3					3	1		2		
5.	3	3		3	2				3	1		2		



**COURSE OBJECTIVES:**

- To provide exposure to the students with hands on experience in basic of Electrical and Electronics wiring connection and measurements.
- To introduce the students to Electrical Machines and basic laws of Electrical Circuits.

**LIST OF EXPERIMENTS**

1. Wiring – Residential house wiring and Stair case wiring.
2. (a) AC Analysis- Measurement of electrical quantities–voltage, current, power, and power factor using RLC.  
(b) Study of three phase system.
3. Energy conservation - Measurement and comparison of energy for incandescent lamp and LED lamp.
4. (a) Identification of circuit components (Resistor, Capacitor, Diode and BJT) and soldering practice.  
(b) Signal Measurement- Measurement of peak to peak, RMS, average, period, frequency of signals using CRO.
5. (a) VI Characteristics of Solar photovoltaic panel.  
(b) Design of Solar PV Array and Battery sizing for Residential solar PV system.
6. Design a 5V/12V Regulated Power Supply using FWR and IC7805/IC7812.
7. DC Analysis- Verification of Ohm's Law and Kirchhoff's Laws.
8. Study of Transformer and motor characteristics.

**TOTAL: 30 PERIODS****REFERENCES:**

1. Mittle V.N, Arvind Mittal, "Basic Electrical Engineering", Tata Mc Graw Hill (India), Second Edition, 2013.
2. Sedha R.S., "A Text Book of Applied Electronics", S.Chand & Co., 2014.

**BL – Bloom's Taxonomy Levels**

SL.NO	STATEMENT	RBT LEVEL
CO1.	Wiring of basic electrical system and measurement of electrical parameters.	AN
CO2.	Verify the basic laws of Electric circuits and select various Electrical Machines.	AN
CO3.	Construct electronic circuits and design solar photovoltaic system.	AN
CO4.	Apply the concept of three-phase system.	AN
CO5.	Construct a fixed voltage regulated power supply.	AN

## COURSE ARTICULATION MATRIX

COs	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.	3	3	3	3					2			2		
2.	3	3	3	3					2			2		
3.	3	3	3	3					2			2		
4.	3	3	3	3					2			2		
5.	3	3	3	3					2			2		



IT22111

**Programming for Problem solving Laboratory**  
(Common to IT, AD, CS, EE, EC)

L	T	P	C
0	0	3	1.5

**OBJECTIVES:**

- Be exposed to the syntax of C.
- Be familiar with programming in C.
- Learn to use arrays, strings, functions, pointers, structures and unions in C.

**LIST OF EXERCISES**

1. Usage of Basic Linux commands.
2. C Programming using Simple statements and expressions.
3. Scientific problem solving using decision making and looping.
4. Simple programming for one dimensional and two dimensional arrays.
5. Solving problems using Strings.
6. C Programming using Pointers.
7. C Programming using user defined functions (Pass by value and Pass by reference) .
8. C Programming using Recursion.
9. C Programming using structures and union.
10. C Programming using enumerated data types.
11. C Programming using macros and storage classes.
12. C Programming using Files.
13. Develop modularized application for any one of the following scenarios.

**Scenarios:**

- Student Management System
- Stock Management System
- Banking Application
- Ticket Reservation System

**Total (P:45 PERIODS)**

**OUTCOMES:**

Upon successful completion of the course, the students should be able to

CO#	STATEMENT	RBT LEVEL
1	Apply appropriate programming constructs to solve problems.	AP
2	Design, implement, test and debug programs that use the basic features of C.	E
3	Design modularized applications in C to solve real world problems.	C
4	Use C pointers and dynamically allocated memory to solve complex problems	AN
5	Apply file operations to develop solutions for real-world problems	AP

**TEXT BOOKS:**

1. Pradip Dey, Manas Ghosh, “ Programming in C ”, First Edition, Oxford University Press, 2018.
2. Byron S Gottfried, “Programming with C”, Schaum’s Outlines, Third Edition, Tata McGrawHill, 2010.

**LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS**

- Computer with Windos/Linux OS and C compiler - 30 No.s

**COURSE ARTICULATION MATRIX**

COs	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.	1	3						2	3			2	2	2
2.	1	3						2	3			2	2	2
3.	1		3	2	1			2	3			2	2	2
4.	1		3	2	1			2	3			2	2	2
5.	1		3	2	1			2	3			2	3	3

HS22251

அறிவியல் மற்றும் தொழில்நுட்பத்தில் தமிழ்  
SCIENCE AND TECHNOLOGY IN ANCIENT  
TAMIL SOCIETY

(Common to all Branches)

L	T	P	C
2	0	0	2

பாடத்தின் நோக்கங்கள் :

- அறிவியலில் தமிழின் பயன்பாடு பற்றி தெரிந்து கொள்வார்கள்.
- தொழில்நுட்பத்தில் தமிழ் பாரம்பரியத்தின் தாக்கம் பற்றி அறிந்து கொள்வார்கள்.

OBJECTIVES:

- They will know about the use of Tamil in science.
- Learn about the impact of Tamil heritage on technology.

அலகு 1 அறிவியல் தமிழ்

6

கருவி உருவாக்கம் - ஆராய்ச்சி மேம்பாடு - கல்வி வளர்ச்சி - அறிவியல் தமிழ் சொற்கள் உருவாக்கம்.

UNIT I SCIENTIFIC TAMIL

Tool Development - Research Development - Educational Development - Scientific Tamil words Creation.

அலகு 2 தொழில்நுட்பத்தில் தமிழ்

24

வடிவமைப்பு மற்றும் கட்டுமான தொழில்நுட்பம் : சங்க காலத்தில் கட்டுமானப் பொருட்கள் - சோழர்களின் பெரியகோவில்கள் மற்றும் பிற வழிபாட்டுதலங்கள் - பல்லவர்களின் சிற்பங்கள் மற்றும் கோவில்கள் (மாமல்லபுரம்) - நாயக்கன் கால கோவில்கள் (மதுரை மீனாட்சி அம்மன் கோவில்), திருமலை நாயக்கர் மஹால், செட்டிநாட்டு வீடுகள்.

உற்பத்தி தொழில் நுட்பம் : கப்பல் கட்டும் கலை, உலோகவியல் ஆய்வுகள், தங்கம், தாமிரம், இரும்பு பற்றிய அறிவு - தொல்பொருள் சான்றுகள் - சுட்டக் களிமண் மணிகள், சங்கு மணிகள், எலும்பு மணிகள்.

விவசாயம் மற்றும் நீர்ப்பாசன தொழில்நுட்பம் : அணைகள், ஏரிகள், குளங்கள், மதகுகள், சோழர் கால குழுவி தூம்பு ஆகியவற்றின் முக்கியத்துவம் - கால்நடை பராமரிப்பு, கால்நடைகளின் பயன்பாட்டிற்காக வடிவமைக்கப்பட்ட கிணறுகள். விவசாயம் மற்றும் வேளாண் செயலாக்கம் - கடல் பற்றிய அறிவு - மீன் பிடித்தல், முத்து குளித்தல், சங்கு சேகரித்தல்.

தமிழ் கணினி: அறிவியல் தமிழ் வளர்ச்சி - தமிழ் கணினி, தமிழ் புத்தகங்களின் டிஜிட்டல்மயமாக்கல், தமிழ் டிஜிட்டல் நூலகம், தமிழ் மென்பொருள் உருவாக்கம் - தமிழ் மெய் நிகர் அகாடமி - சொற்குவை திட்டம்.

தமிழின் எதிர்காலமும் தகவல் தொழில்நுட்பமும் - உலகமயமாக்கலும் தகவல் தொழில்நுட்பமும் - கணினிக்கு தமிழ் கற்று கொடுத்தல் - தமிழ்மொழித் தொழில்நுட்பத்தில் வளங்கள்.

## UNIT II TAMIL IN TECHNOLOGY

**Design and Construction Technology :** Building materials in Sangam age – Great temples of Cholas and other workshop places – Sculptures and Temples of Pallavas (Mamallapuram) – Temples of Nayakas period (Madurai Meenakshi amman temple), Thirumalai Nayakar Mahal, Chetti Nadu Houses.

**Manufacturing Technology :** Art of Ship building, Metallurgical studies, Knowledge about Gold, Copper, Iron – Archeological evidences – Terracotta beads, Shell beads, Bone beads.

**Agriculture and Irrigation Technology:** Dams, Tank, ponds, sluice, Significance of Kumuzhi Thoompu of Cholas period- Animal Husbandry, Wells designed for cattle use. Agriculture and Agro processing, - Knowledge about Sea – Fisheries, Pearl, Conche diving.

**Tamil Computing :** Development of Scientific Tamil – Tamil Computing, Digitization of Tamil books, Tamil Digital Library, Development of Tamil Softwares – Tamil virtual Academy – Sorkuvai project. Future of Tamil and Information Technology- Globalization and Information Technology- Teaching Tamil for Computer-Resources in Tamil Language Technology.

**TOTAL : 30 PERIODS**

பாடநெறி முடிவுகள் :

**OUTCOMES:**

CO	CO statements	RBT Level
CO1	அறிவியலில் தமிழ் மொழியின் பயன்பாடு பற்றி தெரிந்து கொள்வார்கள் They will know about the use of Tamil language in science	2
CO2	பல்வேறு தொழில்நுட்பத்தில் தமிழ்மொழியின் தாக்கம் பற்றி அறிந்து கொள்வார்கள் They will learn about the influence of Tamil language in various technologies	3

1- Remember, 2- Understand, 3- Apply, 4- Analyse, 5- Evaluate, 6- Create

பாடநூல்கள்:

**REFERNCES:**

1. டாக்டர், வா.செ .குழந்தைசாமி (1985), "அறிவியல் தமிழ்" , பாரதி பதிப்பகம், 126/108, உஸ்மான் சாலை, தியாகராய நகர் , சென்னை 600017.
2. சுப. திண்ணப்பன், (1995), "கணினியும் தமிழ் கற்பித்தலும்", புலமை வெளியீடு, 38-B மண்ணத்தோட்டத் தெரு, ஆழ்வார்பேட்டை, சென்னை 600018.
3. மு. பொன்னவைக்கோ, (2003), "வளர்தமிழில் அறிவியல் – இணையத் தமிழ்", அனைத்திந்திய அறிவியல் தமிழ்க் கழகம், தஞ்சாவூர் 615 005.
4. துரை. மணிகண்டன், (2008), "இணையமும் தமிழும்", நல்நிலம் பதிப்பகம், 7-3, சிமேட்லி சாலை, தியாகராய நகர், சென்னை 600 017.

## COURSE ARTICULATION MATRIX

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1	-	-	3	2	3	3	2	2	3	3	-	2	-	-
2	-	-	3	2	3	3	2	-	3	3	-	2	-	-

3-High, 2-Medium, 1-Low, '-' – no correlation





**COURSE OBJECTIVES:**

1. Enable learners to define and understand technical communication and scientific writing
2. Expose learners to the technicalities of seminar presentation, group discussion, and public speaking
3. Develop learners' writing skills for scientific and documenting purposes
4. Improve learners' ability to draft correspondences for business purposes
5. Cultivate learners' ability to holistically understand the nuances of job interviews and recruiting process.

**UNIT I****9 Hours**

Listening - AV files pertaining to manufacturing processes of products, scientific documentaries; Speaking - syllable division and word stress, intonation, sharing opinions; Reading - news articles related to science and technology; Writing - definitions, instruction, recommendation, data interpretation, resume; Grammar -tenses and their aspects, sentence connectors – discourse markers, sequential words, active and passive voice, subject-verb agreement.

**UNIT II****9 Hours**

Listening - AV pertaining to marketing strategies, peer reading and pronunciation; Speaking- turn taking, sharing opinions; conducting and attending a meeting, understanding the nuances of spoken communication among internal audience and external audience; Reading - analytical documents, descriptive documents; Writing - fliers, brochures, resume - letter of application, checklists; Grammar - modal verbs, clauses - types and uses, conditional clauses, articles.

**UNIT III****9 Hours**

Listening - AV related to how to use components, scientific description, Speaking - speaking for motivation and initiation, speaking at a seminar presentation; Reading - scientific journals, papers; Writing - Technical descriptions - process description, purpose and function, PowerPoint, Google forms, user manuals; Grammar - phrasal verbs, prepositions, technical and scientific affixes.

**UNIT IV****9 Hours**

Listening - scientific debates, crisis management; Speaking - handling conflicts, speaking about the loss of benefits, progress or decline of business, identifying the connotative meanings, Reading- documented evidences of uses and functions of a product, review of a product, Writing - memos, follow-up letters, reports - proposal, project, progress reports, sales reports, reports on industrial visits, executive summary. Grammar - reported speech and tag questions, sentence structure - comparative, imperative, cause and effect, infinitive of result.

## UNIT V

9 Hours

Listening - AV of Group discussions, panel discussions, face to face interviews for recruitment purposes; Speaking- speaking at group discussions, interviewing a personality, answering at the interviews; Reading - WebPages of top notch engineering companies, Writing - blogging, e-mails, letter of complaint, minutes of the meeting; Grammar - one word substitution, collocations, better word/sentence substitution (rephrasing the content/improving ideas).

**TOTAL: 45 PERIODS**

### REFERENCES:

1. Department of English, Anna University. *Mindscales: English for Technologists and Engineers*. Orient Blackswan, Chennai. 2012.
2. Downes, Colm, *Cambridge English for Job-hunting*, Cambridge University Press, New Delhi. 2008
3. Murphy, Raymond, *Intermediate English Grammar with Answers*, Cambridge University Press 2000.
4. Thomson, A.J., *Practical English Grammar 1 & 2*, Oxford, 1986.
5. Herbert A J, *The Structure of Technical English*, Longman, 1965.

### Websites

1. <http://www.usingenglish.com>
2. <http://www.uefap.com3>
3. <https://owl.english.purdue.edu/owl/>
4. [www.learnenglishfeelgood.com/esl-printables-worksheets.html](http://www.learnenglishfeelgood.com/esl-printables-worksheets.html)

### Software

1. Face 2 Face Advance – Cambridge University Press, 2014.
2. English Advance Vocabulary- Cambridge University Press.
3. IELTS test preparation – Cambridge University Press 2017.
4. Official Guide to the TOEFL Test With CD-ROM, 4th Edition.
5. Cambridge Preparation for the TOEFL TEST- Cambridge University Press, 2017.

### OUTCOMES:

Upon successful completion of the course, the students should be able to

CO.NO	STATEMENT	RBT LEVEL
1	Understand the nuances of technical communication and scientific writing	AP
2	Present papers and give seminars	C
3	Discuss in groups and brainstorm	C
4	Draft business correspondences and write for documenting purposes	C
5	Face job interviews with confidence	C

**COURSE ARTICULATION MATRIX**

COs	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.										3				
2.										3				
3.										3				
4.										3				
5.										3				



**COURSE OBJECTIVES:**

The Student should be made to:

1. Acquire the concepts of vector calculus needed for problems in all engineering disciplines and compute different types of integrals using Green's, Stokes' and Divergence theorems.
2. Skilled at the techniques of solving ordinary differential equations that model engineering problems.
3. Extend their ability of using Laplace transforms to create a new domain in which it is easier to handle the problem that is being investigated.
4. Explain geometry of a complex plane and state properties of analytic functions.
5. Understand the standard techniques of complex variable theory so as to apply them with confidence in application areas such as heat conduction, elasticity, fluid dynamics and flow of electric current.

**UNIT I VECTOR CALCULUS****12**

Gradient, divergence and curl - Directional derivative - Vector identities – Irrotational and solenoidal vector fields - Line integral over a plane curve – Surface integral - Area of a curved surface - Volume integral - Green's theorem in a plane, Gauss divergence theorem and Stokes' theorem (excluding proofs) – Verification and application in evaluating line, surface and volume integrals.

**UNIT II ORDINARY DIFFERENTIAL EQUATIONS AND ITS APPLICATIONS****12**

Differential equations of first order – Equations of the first order and first degree – Linear equations – Higher order linear differential equations with constant coefficients - Method of variation of parameters - Cauchy's and Legendre's linear equations - Simultaneous first order linear equations with constant coefficients – Applications of Linear differential equations – Oscillatory electrical circuit – Deflection of beams.

**UNIT III LAPLACE TRANSFORM****12**

Conditions for existence - Transform of elementary functions - Transforms of unit step function and impulse functions – Basic properties – Shifting theorems - Transforms of derivatives and integrals of functions - Derivatives and integrals of transforms - Initial and final value theorems - Transform of periodic functions. Inverse Laplace transforms - Convolution theorem – Application to solution of linear ODE of second order with constant coefficients using Laplace transformation techniques.

**UNIT IV ANALYTIC FUNCTIONS****12**

Analytic functions - Necessary and sufficient conditions (Cauchy-Riemann equations) - Properties of analytic function - Harmonic conjugates - Construction of analytic functions - Conformal mapping – Mapping by functions  $W = Z + C$ ,  $CZ$ ,  $1/Z$ ,  $Z^2$  – Joukowski's

transformation- Bilinear transformation.

## UNIT V COMPLEX INTEGRATION

12

Cauchy's integral theorem - Cauchy's integral formula - Taylor's and Laurent's series expansions - Singular points - Residues - Cauchy's Residue theorem – Application of residue theorem for evaluation of real integrals – Use of circular contour and semi-circular contour.

**TOTAL (L:45+T:15): 60 PERIODS**

### TEXT BOOKS:

1. Erwin Kreyszing, Herbert Kreyszing, Edward Norminton, “Advanced Engineering Mathematics”, 10<sup>th</sup> Edition, John Wiley, (2015).
2. Grewal .B.S, Grewal .J.S “Higher Engineering Mathematics”,43<sup>rd</sup> Edition, Khanna Publications, Delhi, (2015).

### REFERENCES:

1. Dass, H.K., and Rajnish Verma, “Higher Engineering Mathematics”, S.Chand Private Ltd., 2011.
2. Ramana B.V, “Higher Engineering Mathematics”, Tata McGraw Hill Publishing Company, New Delhi, (2013).
3. Bali N. P and Manish Goyal, “A Text book of Engineering Mathematics”, 9<sup>th</sup> edition, Laxmi Publications(p) Ltd., 2014.

### WEB LINK:

1. <https://nptel.ac.in/courses/111/105/111105134/>
2. <https://nptel.ac.in/courses/111/105/111105121/>

### COURSE OUTCOMES:

Course Outcomes	Upon completion of the course, students will be able to:	RBT* Level
CO1	Interpret the fundamentals of vector calculus and execute evaluation of line, surface and volume integrals using Gauss, Stokes and Green's theorems.	AP
CO2	Solve first order linear, homogeneous differential equations and use series solution method to solve second order differential equations.	AP
CO3	Determine the methods to solve differential equations using Laplace transforms and Inverse Laplace transforms.	AP
CO4	Explain Analytic functions and Categorize transformations.	AP
CO5	Perform Complex integration to evaluate real definite integrals using Cauchy integral theorem and Cauchy's residue theorem.	AP

## COURSE ARTICULATION MATRIX

COs	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
CO1		3	2	2								3		
CO2	3	3	3	3								3		
CO3	3	3	3	3								3		
CO4	3	3										3		
CO5	3	3										3		



ME22251

**Technical Drawing**  
(Common to AD, CS, IT)

L T P C  
1 0 2 2

**OBJECTIVES :**

- This course will introduce the students to build their ability to read drawings and interpret the position and form of simple geometries.

**UNIT 0 CONCEPTS AND CONVENTIONS AND GEOMETRIC CONSTRUCTION (NOT FOR EXAM) 2**

Importance of drawing in engineering applications - Use of drafting instruments - BIS conventions and specifications - Size, layout and folding of drawing sheets - Lettering and dimensioning. Geometric construction - to draw perpendiculars, parallel lines, divide a line and circle, to draw equilateral triangle, square, regular polygons.

**UNIT I CONICS, CYCLOID, AND INVOLUTES 7**

Geometric construction - Curves used in engineering practices: Conics - Construction of parabola and hyperbola by eccentricity method -Construction of ellipse by Concentric circle method - Drawing of tangents and normal to the above curves -Construction of cycloid in a straight line only- Drawing of tangents and normal to the above curve. Construction of involutes of square, pentagon and circle - Drawing of tangents and normal to the above involutes.

**UNIT II PROJECTION OF LINES AND PLANE SURFACES 9**

Orthographic projection – First angle projection - 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.

Projection of planes (polygonal and circular surfaces) inclined to one of the principal planes and perpendicular to other by rotating object method.

**UNIT III PROJECTION OF SOLIDS 9**

Projection of simple solids like prisms, pyramids, cylinder, cone when the axis is inclined to one of the principal planes and parallel to the other by rotating object method.

**UNIT IV DEVELOPMENT OF SURFACES 9**

Development of Surfaces – Development of lateral surfaces of simple solids - Parallel line Development – Prisms, Cylinder - Radial line development – Pyramids and Cone.

**UNIT V ORTHOGRAPHIC AND ISOMETRIC PROJECTION 9**

Isometric view of simple solids -Free Hand Drawing - Orthographic Projection - Orthographic views of simple blocks from their Isometric view

**TOTAL : 45 (15 L+30P) PERIODS**

**OUTCOMES :** On Completion of the course the student will be able to

CO	CO statements	RBT level
CO1	<b>Construct</b> conic sections, cycloid and involutes as per drawing standards	U
CO2	<b>Draw</b> orthographic projections of lines and plane surfaces.	AP
CO3	<b>Sketch</b> orthographic projections of simple solids.	AP
CO4	<b>Develop</b> the lateral surfaces of simple solids.	AP
CO5	<b>Sketch</b> the orthographic projections of a given isometric view using free hand	AP

**TEXT BOOKS:**

1. Bhatt N.D. and Panchal V.M., “Engineering Drawing”, Charotar Publishing House, 53rd Edition, 2019.
2. Dhananjay M. Kulkarni, A.P. Rastogi, Ashoke K. Sarkar, “Engineering Graphics with AutoCAD”, PHI Learning Private Ltd., 2009.
3. Venugopal K. and Prabhu Raja V., “Engineering Drawing + AutoCAD”, New Age International (P) Limited, 6<sup>th</sup> edition, 2022

**REFERENCES :**

1. Dhananjay A Jolhe, “Engineering Drawing with an Introduction to AutoCAD”, Tata McGraw-Hill Publishing Company Limited., 2008
2. Parthasarathy N. S. and Vela Murali, “Engineering Graphics”, Oxford University, Press, New Delhi, 2015.
3. Shah M.B., and Rana B.C., “Engineering Drawing”, Pearson Education India, 2nd Edition, 2009.
4. Natrajan K.V., “A Text Book of Engineering Graphics”, Dhanalakshmi Publishers, Chennai, 2018.

**WEB RESOURCES:**

1. <https://nptel.ac.in/courses/112105294>
2. <https://nptel.ac.in/courses/112103019>

**COURSE ARTICULATION MATRIX**

COs	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
CO1										1				
CO2										2				
CO3										2				
CO4										3				
CO5										3				



<b>IT22201</b>	<b>COMPUTER ORGANIZATION AND ARCHITECTURE</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OBJECTIVES:**

- To make students understand the basic structure and operation of digital computer
- To understand the hardware-software interface
- To familiarize the student with arithmetic and logic unit and implementation of fixed point and floating point arithmetic operations.
- To expose the students to the concept of pipelining
- To familiarize the students with hierarchical memory system including cache memory and virtual memory
- To expose the students with different ways of communicating with I/O devices and standard I/O interfaces.

**UNIT I BASIC COMPUTER ORGANIZATION AND DESIGN 9**

Instruction codes, Computer registers, computer instructions, Timing and Control, Instruction cycle, Memory-Reference Instructions, Input-output and interrupt, Complete computer description, Design of Basic computer, design of Accumulator Unit.

**UNIT II ALU AND CU 9**

ALU - Addition and subtraction – Multiplication – Division – Floating Point operations –Subword parallelism. CPU- General Register Organization, Stack Organization, Instruction format, Addressing Modes, data transfer and manipulation, Program Control, Reduced Instruction Set Computer (RISC).

**UNIT III PIPELINING AND HAZARDS 9**

Basic MIPS implementation – Building datapath – Control Implementation scheme – Pipelining – Pipelined datapath and control – Handling Data hazards & Control hazards – Exceptions, The ARM Cortex-A8 and Intel Core i7 Pipelines.

**UNIT IV MEMORY AND I/O SYSTEMS 9**

Memory hierarchy - Memory technologies – Cache basics – Measuring and improving cache performance - - Input/output system, programmed I/O, DMA and interrupts, I/O processors.

**UNIT V MULTICORES, MULTIPROCESSORS, AND CLUSTERS 9**

Shared Memory Multiprocessors, Clusters and Other Message-Passing Multiprocessors Hardware Multithreading, SISD, MIMD, SIMD, SPMD, and Vector, Introduction to Graphics Processing Units, Clusters, Warehouse Scale Computers, and Other Message-Passing Multiprocessors.

**TOTAL: 45 PERIODS**

## OUTCOMES:

At the end of the course, the student should be able to:

CO	CO statements	RBT level
CO1	Build the basic structure of computer, operations and instructions.	AP
CO2	Design arithmetic and logic unit.	AP
CO3	Design and analyze pipelined control units.	AP
CO4	Evaluate performance of memory and I/O systems.	E
CO5	Construct the parallel processing architectures.	AP

## TEXT BOOKS:

1. David A. Patterson and John L. Hennessey, "Computer organization and design", Morgan kauffman / elsevier, Fifth edition, 2014.

## REFERENCES:

1. V. Carl Hamacher, Zvonko G. Varanesic and Safat G. Zaky, "Computer Organisation", VI edition, McGraw-Hill Inc, 2012.
2. William Stallings "Computer Organization and Architecture", Seventh Edition, Pearson Education, 2006.
3. Vincent P. Heuring, Harry F. Jordan, "Computer System Architecture", Second Edition, Pearson Education, 2005.
4. Govindarajalu, "Computer Architecture and Organization, Design Principles and Applications", first edition, Tata McGraw Hill, New Delhi, 2005.
5. John P. Hayes, "Computer Architecture and Organization", Third Edition, Tata McGraw Hill, 1998.
6. <http://nptel.ac.in/>.

## COURSE ARTICULATION MATRIX

COs	PO													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.	1	3							3			2		
2.	1	3							3			2		
3.	1		3	2	1				3			2		
4.	1		3	2	1				3			2		
5.	1		3	2	1				3			2		

**OBJECTIVES**

- Be familiar with the C++ concepts of abstraction, encapsulation, constructor , polymorphism, overloading and Inheritance.
- Be familiar with objects in python.  
Be familiar with python data structures and design patterns.

**UNIT I OBJECT ORIENTED PROGRAMMING FUNDAMENTALS 9**

C++ Programming features - Data Abstraction - Encapsulation - Class -Object - Constructors – Static members – Constant members – Member functions – Pointers – References - Role of this pointer – String Handling.

**UNIT II OBJECT ORIENTED PROGRAMMING CONCEPTS 9**

Dynamic memory allocation - Nested classes - Polymorphism – Compile time and Run time polymorphisms – Function overloading – Operator overloading - Inheritance - Virtual Functions - Abstract class.

**UNIT III C++ PROGRAMMING ADVANCED FEATURES 9**

Generic Programming - Function template - Class template - Exception handling - Standard template libraries – containers – iterators – function adaptors – allocators - File handling concepts.

**UNIT IV OBJECTS IN PYTHON 9**

Creating python classes, modules and packages, basic inheritance and multiple inheritance, Managing objects

**UNIT V PYTHON DATA STRUCTURES AND DESIGN CONCEPTS 9**

Tuples, Dictionaries, List, Sets, Built-in functions, Design patterns-Decorator, Observer , Strategy, State, Singleton, Template.

**TOTAL : 45 PERIODS**

<b>OUTCOMES:</b>		
<b>CO</b>	<b>CO statements</b>	<b>RBT level</b>
<b>CO1</b>	Examine the features and basics of OOPS.	AN
<b>CO2</b>	Apply the various features of object oriented programming to construct applications in C++.	AN
<b>CO3</b>	Develop the software using advanced features of Object oriented programming to solve real time problems.	E
<b>CO4</b>	Develop the programs to implement the basics of python	E
<b>CO5</b>	Choose the data structures and design patterns to construct applications using python	E

**TEXT BOOKS:**

1. Bjarne Stroustrup, "The C++ Programming Language", 4th Edition, Addison-Wesley Professional, 2013.
2. Dusty Philips Python 3 Object-oriented Programming - Second Edition 2015, packt publishers.

**REFERENCES:**

1. KR.Venugopal& Rajkumar Buyya "Mastering C++", second edition 2013.
2. Reema Thareja "PYTHON PROGRAMMING Using Problem Solving Approach", Oxford University Press, 2017.

**COURSE ARTICULATION MATRIX**

COs	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.	1	3							3			2		
2.	1	3							3			2		
3.	1		3	2	1				3			2		
4.	1		3	2	1				3			2		
5.	1		3	2	1				3			2		

**BT22101**

**BIOLOGY FOR ENGINEERS**  
**(Common to BT/AE/IT)**

**L T P C**  
**3 0 0 3**

**OBJECTIVES:**

- To Illustrate the unit of life and its function
- To Study the implications of engineered products and process on living matters
- To Understand biological function for the application in the product and process engineering
- To Discuss the impact of the machine on human
- To Understand the regulation and ethics

**UNIT – I Introduction to Biology**

**8**

Origin of life and Evolution, Cells - Prokaryotes and Eukaryotes, Biochemical nuts and bolts - water, carbohydrates, lipids, proteins, DNA, RNA and enzymes, Introduction to metabolism, Mendelian genetics, Chromatin, DNA structure, replication, transcription and translation. Human system - skeletal structure, types of connective tissues, structure of joints, muscle and organ structure and function, cardiac physiology, blood properties and flow, nervous system. Plant system- organization of plants, Photosynthesis and Respiration, Growth and Development Hormones. Microbial system - Bacteria, yeast, fungi, protozoan, Algae and virus.

**UNIT – II Application of Biological Principles in Engineering**

**12**

Biological functions for Camera for imaging, image recognition, visual information processing, Information and Communication Technologies, memristor, optoelectronic, speech recognition, smart sensing, sensorimotorics, neuromorphic and artificial intelligence. Biology in biomimicry – Sharkskin inspired swimsuits, Burr inspired Velcro, Whale fin inspired wind turbine blades, cooling fans, airplane wings and propellers, lotus inspired paintbrushes, Stenocara shell inspired water collection, skeleton structure of blowfish inspired designing of vehicles, termites and *Scyliorhinus canicular* inspired architecture and natural colour inspired nanophotonic crystal.

**UNIT – III Biologically Inspired products, process, and matters**

**12**

Case study on workload ergonomics, system ergonomics and information ergonomics, Ultrasound imaging, X-Ray and PET scanning, Bioelectromagnetism - Touch Screen Technology, Force and torque sensor, inertial sensing technology and motion capture systems, Human-in-the-loop process, Bioactuators, Biocybernetics, Biotelemetry, Bionic (rehabilitation), Bioreactor, Bioremediation, Biofertilizer, Bioenergy, Biosensors, Biopolymers, Biofilters, Biochips, Microbial fuel cells in vehicles. Biotechnological reliance in space, agriculture and nuclear energy.

**UNIT – IV Impact of Machine/Devices on Human**

**5**

Biological effects – Somatic and genetic effect, Exposure and health effects – microwaves, radiation, radiofrequency and electronic gadgets, Man-made and Technological hazards, Impact on ecosystem - Chemical, nuclear, radiological, transportation and e-waste hazards.

**UNIT – V Regulations**

**8**

International and National regulatory bodies - Radiation in the electromagnetic spectrum, Electronic devices, Cell phones, Smart meters, Medical use of radiation and Nuclear power plants, Labeling Regulatory Requirements for Medical Devices, Ethics and privacy cameras and surveillance system, Regulation of Human Cloning and Embryonic Stem Cell Research, Privacy and ethical issues in 3D whole body scanning, Regulation of emerging gene technologies.

**TOTAL : 45 PERIODS**

**COURSE OUTCOMES:**

After completion of this course, the students will be able to:

CO#	STATEMENT	RBT LEVEL
1.	Distinguish the structure and function of prokaryotic and eukaryotic cells.	AN
2.	Explains the usage of biological principles in engineering.	U
3.	Integrate the concepts of biology with engineering through case studies.	AP
4.	Describe the influence of biologically inspired materials/machine/devices on environment and society.	U
5.	Understand the regulations, ethics, security and safety of engineering applications.	U

**TEXTBOOKS:**

- Johnson, A. T. Biology for engineers. CRC Press, 2011.
- Vaccari, D. A., Strom, P. F., & Alleman, J. E. Environmental biology for engineers and scientists (Vol. 7, p. 242). New York: Wiley-Interscience, 2006.
- Waite, G. N., & Waite, L. R. Applied cell and molecular biology for engineers. McGraw-Hill Education, 2007.
- Khandpur, R. S. Biomedical instrumentation: Technology and applications (Vol. 1). New York: McGraw-hill, 2005.
- Salvendy, G. (Ed.). Handbook of human factors and ergonomics. John Wiley & Sons, 2012.

**REFERENCE BOOKS:**

- Nelson, D. L., Lehninger, A. L., & Cox, M. M. Lehninger principles of biochemistry. Macmillan, 2008.
- Subrahmanyam, S. A Textbook of Human Physiology. S. Chand Limited, 1987.
- Kindt, T. J., Goldsby, R. A., Osborne, B. A., & Kuby, J. Kuby immunology. Macmillan, 2007

**COURSE ARTICULATION MATRIX**

COs	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.	2											1		
2.	3	2				1								
3.		2	1			2				2		1		
4.		1		2			3							
5.						3	3	3				1		

**OBJECTIVES**

The students should be made to:

- To acquire basic of Computer assembling and trouble shooting.
- To gain knowledge on installation process To acquire basic knowledge in computer hardware and peripherals for installation, PC assembly, trouble shooting and maintenance including system management and its backup and to undertake disaster prevention, a basic knowledge of TCP/IP networks work group, internet and intranet.
- To install OS, customize OS.

**List of Exercises**

1. To make comparative study of motherboards.
2. To study various cards used in a system viz. display card, LAN card etc.
3. To study monitor, its circuitry and various presents and some elementary fault detection.
4. To study printer assembly and elementary fault detection of DMP and laser printers.
5. To observe various cables and connectors used in networking.
6. To study parts of keyboard and mouse.
7. To assemble a PC.
8. Troubleshooting exercises related to various components of computer like monitor, drives, memory and printers etc.
9. Any OS installation
10. Customize Operating System and maintenance of system application *software*.
11. Configuration of Proxy Server.

**TOTAL: 45 PERIODS**

**OUTCOMES:**

At the end of the course, the student should be able to:

<b>CO</b>	<b>CO statements</b>	<b>RBT level</b>
<b>CO1</b>	Demonstrate installation of computer hardware and peripherals	AP
<b>CO2</b>	Demonstrate PC assembly, trouble shooting and maintenance including system management and its backup	AP
<b>CO3</b>	Elucidate knowledge of TCP/IP networks work group, internet and intranet.	AP
<b>CO4</b>	To install OS, customize OS	AP
<b>CO5</b>	To Configure Proxy server	AP

**REFERENCES:**

1. Bjarne Stroustrup, "The C++ Programming Language", 4th Edition, Addison-Wesley Professional, 2013.
2. Dusty Philips Python 3 Object-oriented Programming - Second Edition 2015, packt publishers.

## LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

1. Computers - 30 No.s

## COURSE ARTICULATION MATRIX

COs	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.	1	3							3			2		2
2.	1	3							3			2		2
3.	1		3	2	1				3			2		2
4.	1		3	2	1				3			2		2
5.	1		3	2	1				3			2		2





**OBJECTIVES**

The students should be made to:

- To understand the concepts of Object Oriented Programming
- To understand the features of C++ constructs.
- To understand python data structures and design patterns

**List of Exercises**

Creating simple applications using C++ by implementing the following concepts

1. Constructors and Destructor.
2. Friend Function and Friend Class.
3. Polymorphism and Function Overloading.
4. Overload Unary and Binary Operators Both as Member Function and Non Member Function.
5. Inheritance.
6. Virtual Functions.
7. Class Templates and Function Templates.
8. Exception Handling Mechanism.
9. Standard Template Library concept

Creating simple applications using Python by implementing the following concepts

1. Classes, Modules and Packages
2. Basic Inheritance and Multiple Inheritance
3. Tuples, Dictionaries, List, Sets
4. Built-in functions
5. Design patterns.

**TOTAL: 45 PERIODS**

**OUTCOMES:**

At the end of the course, the student should be able to:

CO	CO statements	RBT level
CO1	Develop programs using OOPS concepts to solve the problems	AP
CO2	Apply design patterns to design the solution for the problem	AP
CO3	Choose inheritance, polymorphism or exception handling mechanism to implement reusable robust C++ programs	AP
CO4	Apply the concepts of classes, packages, data structures using python	AP
CO5	Design user interface using C++ and Python for the real time applications.	C

**REFERENCES:**

1. Bjarne Stroustrup, "The C++ Programming Language", 4th Edition, Addison-Wesley Professional, 2013.
2. Dusty Philips Python 3 Object-oriented Programming - Second Edition 2015, packt publishers.

## LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

1. Computers installed with Linux OS/Windows OS and Python Compiler - 30 No.s

### COURSE ARTICULATION MATRIX

COs	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.	1	3							3			2		2
2.	1	3							3			2		2
3.	1		3	2	1				3			2		2
4.	1		3	2	1				3			2		2
5.	1		3	2	1				3			2		2



MA22353

**DISCRETE MATHEMATICS**  
(Common to CS & IT)

**L T P C**  
**3 1 0 4**

**OBJECTIVES:**

The Students should be made to:

- Extend student's Logical and Mathematical ability to deal with abstraction.
- Acquire basics of set theory, functions and counting, apply them in day to day problems.
- Understand the fundamental concepts of the Graph theory and Network connectivity.
- Gain the concepts to identify structures of algebraic nature, prove and use properties about them.
- Learn relations, Lattice, Boolean algebras and their properties to comprehend problems in computer Science.

**UNIT – I LOGIC**

**9+3**

Propositional Logic- Connectives -- Propositional equivalences -Normal form –Predicates and Quantifiers – Nested Quantifiers -Validity of a well-formed formula– Rules of inference.

**UNIT – II SET THEORY AND BASICS OF COUNTING**

**9+3**

Basic Concepts of Set Theory- Cartesian product- The Power Set – Functions- Composition of functions -Mathematical induction- The basics of counting - Inclusion and exclusion principle and its applications – The pigeonhole principle – Permutations and combinations – Recurrence relations – Solving linear recurrence relations – Generating functions.

**UNIT – III GRAPH THEORY**

**9+3**

Graphs and Graph models- Graph terminology and special types of Graphs – Matrix representation of Graphs and Graph isomorphism – connectivity – Eulerian and Hamiltonian Graphs.

**UNIT – IV ALGEBRAIC STRUCTURES**

**9+3**

Algebraic structures with one binary operation – Semi groups and monoids - Groups – Subgroups – Homomorphism's – Normal subgroup and cosets – Lagrange's theorem – Algebraic structures (Definitions and simple examples only) with two binary operation- Ring, Integral domain and field.

**UNIT – V LATTICES AND BOOLEAN ALGEBRA**

**9+3**

Relations -Partial ordering – Posets – Lattices as posets – Properties of lattices - Lattices as algebraic systems – Sub lattices – Direct product and homomorphism – Some special lattices – Boolean algebra.

**TOTAL : (L:45+T:15):60 PERIODS**

**COURSE OUTCOMES:**

At the end of the course, students would:

<b>CO #</b>	<b>STATEMENT</b>	<b>RBT LEVEL</b>
1.	Acquire the concepts of set theory and logic to convert from informal language to logic expressions and test the validity of a program.	4
2.	Apply the counting techniques to comprehend computer simulations	2
3.	Develop graph theory tools to map day-to-day applications.	3
4.	Expose to the concepts and properties of algebraic structures which provides solutions in design and analysis of algorithms.	2
5.	Explore Boolean algebraic structures on numerous levels, the concepts needed to test the logic of a program.	2

**TEXTBOOKS:**

- 1 Kenneth H.Rosen, "Discrete Mathematics and its Applications", 8thEdition, Tata Mc Graw

Hill Pub. Co. Ltd., New Delhi, 2021.

- 2 Tremblay J.P. and Manohar R, "Discrete Mathematical Structures with Applications to Computer Science", Tata Mc Graw Hill Pub. Co. Ltd, New Delhi, 53rd reprint 2018.

**REFERENCE BOOKS:**

- 1 Ralph P.Grimaldi., "Discrete and Combinatorial Mathematics: An Applied Introduction", 5th Edition, Pearson Education Asia, Delhi, 2018.
- 2 Thomas Koshy., "Discrete Mathematics with Applications", Elsevier Publications, 2006.
- 3 Seymour Lipschutz and Mark Lipson., "Discrete Mathematics", Schaum's Outlines, Tata McGraw Hill Pub. Co. Ltd., New Delhi, 3<sup>rd</sup> reprint, 6th Edition, 2016.

**WEB LINK:**

1. <https://home.iitk.ac.in/~aral/book/mth202.pdf>
2. <https://archive.nptel.ac.in/courses/106/103/106103205>

**COURSE ARTICULATION MATRIX**

COs	PO												PSO's	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1.	3	3	3	3								3		
2.	3	3										3		
3.	3	3	3	3								3		
4.	3	3										3		
5.	3	3	3	2								3		

**OBJECTIVES:**

The Students should be made to:

- To understand the concepts of ADTs.
- To learn linear data structures – arrays, lists, stacks, and queues.
- To understand non-linear data structures – trees and graphs.
- To understand sorting, searching and hashing algorithms.
- To apply linear and non-linear data structures.

**UNIT – I LINEAR DATA STRUCTURES – ARRAYS****12**

Abstract Datatypes (ADT) - Arrays: insert, delete, reverse, merge sorted arrays; Stack ADT: operations: push-pop-display, Applications – Infix to Postfix Expression Conversion – Postfix expression evaluation, Problems on Stacks: reverse, copy; Queue ADT: Linear Queue operations: enqueue, dequeue, limitations - Circular Queue: operations.

**UNIT – II LINEAR DATA STRUCTURES – LISTS****12**

Structures: Self referential structures with single and multiple links; Limitations of arrays; List ADT: types, Singly Linked List-operations: create, insert, delete, search, sort, truncate, reverse operations; Applications of Singly Linked Lists: Polynomial Manipulation; Limitations of Singly Linked List; Doubly Linked List operations, Circular Linked List operations.

**UNIT – III NON LINEAR DATA STRUCTURES – TREES****9**

Linear Vs Non-Linear Data structures; Binary Trees: terminology, operations: create, find maximum, find minimum, count the number of nodes, swap two Binary Trees ; Binary Search Trees: Operations: insert, delete, search, find minimum, find maximum, traversals; AVL Trees: rotations. Operations; Binary Heaps: Min Heap operations: heapify, remove minimum.

**UNIT – IV NON LINEAR DATA STRUCTURES – GRAPHS****6**

Graphs: Terminologies- weighed graphs, directed and undirected graphs, cycles in graphs; Graph Representations: Adjacency matrix, Adjacency lists; Traversals: Depth First Search, Breadth First Search; Applications and problems: Topological Sort, Single Source Shortest Path problem: Dijkstra's algorithm; Minimal Spanning Trees: Prim's and Kruskal's algorithms.

**UNIT – V SORTING, SEARCHING, AND HASHING****6**

Sorting algorithms: Bubble Sort – Selection Sort – Heap Sort – Insertion Sort; Searching: Linear Search – Binary Search, Hashing: Hash table, Hash function- Collision and resolution strategies: Separate Chaining and open addressing, Rehashing, Double hashing Applications of hashing in file management operations.

**TOTAL :45 PERIODS****COURSE OUTCOMES:**

At the end of the course, students would:

CO #	STATEMENT	RBT LEVEL
1.	Implement ADT linear data structures.	AP
2.	Choose appropriate linear data structure for solving the problem.	E
3.	Implement ADT non-linear data structure.	AP
4.	Apply appropriate graph algorithms for real time applications.	AP
5.	Analyze the various searching and sorting algorithms.	AN

**TEXTBOOKS:**

- 1 Mark Allen Weiss, “Data Structures and Algorithm Analysis in C”, 2e Pearson Education.
- 2 Thomas H Cormen et al, “Introduction to Algorithms”, 3e The MIT Press.

**REFERENCE BOOKS:**

- 1 Mark Allen Weiss, “Data Structures and Algorithm Analysis in C++”, 3e Pearson Education.
- 2 How to Think About Algorithms, Jeff Edmonds, Cambridge University Press.
- 3 Aho, Hopcroft and Ullman, “Data Structures and Algorithms”, Pearson Education.
- 4 Narasimha Karumanchi, “Data Structures and Algorithms Made Easy”, CareerMonk.
- 5 Narasimha Karumanchi, “Data Structures and Algorithmic Thinking with Python”, CareerMonk.

**COURSE ARTICULATION MATRIX**

COs	PO												PSO's	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1.	2	3	1	2	2	1	1	0	1	2	1	3	1	1
2.	1	2	1	2	2	0	0	0	1	1	1	2	1	1
3.	2	3	1	2	3	0	1	0	1	1	1	2	1	1
4.	2	1	2	1	1	0	1	0	2	1	1	2	1	1
5.	1	2	1	2	2	1	1	0	1	2	1	2	1	1

**OBJECTIVES:**

The Students should be made to:

- To learn the fundamentals of data models and to conceptualize and depict a database system using ER diagram.
- To make a study of SQL and relational database design.
- To learn about the internal storage structures using different file and indexing techniques which will help in physical DB design.
- To know the fundamental concepts of transaction processing- concurrency control techniques and recovery procedure.
- To have an introductory knowledge about the Storage and Query processing Techniques.

**UNIT – I DATABASE CONCEPTS AND DESIGN****9**

Purpose of Database System – Levels of Data Abstraction – Data Models– Database System Architecture, – Introduction to relational databases - Relational Model - Keys - Entity-Relationship Model – E-R Diagrams - Motivation for normal forms, dependency theory - functional dependencies, Armstrong’s axioms for FD’s–, Non-loss Decomposition– First, Second, Third Normal Forms, Dependency Preservation – Boyce/Codd Normal Form - Multi-valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Form.

**UNIT – II SQL and NoSQL****9**

Relational Algebra –Relational Calculus, SQL fundamentals - Advanced SQL features- Triggers- Embedded SQL–Dynamic SQL - NoSQL databases - Hbase, MongoDB, Cassandra.

**UNIT – III TRANSACTION PROCESSING AND CONCURRENCY CONTROL****9**

Transaction Concepts, Model – ACID Properties –Serializability-schedules – Recovery and Isolation Levels – SQL transaction Commands - Concurrency – Need for Concurrency – Locking Protocols – Two Phase Locking – Deadlock – Timestamp Protocols.

**UNIT – IV DATA STORAGE AND QUERY PROCESSING****9**

Overview of Physical Storage Media – RAID – File Organization – Organization of Records in Files – Indexing and Hashing –Ordered Indices – B+ tree Index Files – B tree Index Files – Static Hashing – Dynamic Hashing - Query Processing - Evaluation of relational algebra expressions, query equivalence, join strategies, query optimization algorithms.

**UNIT – V ADVANCED DATABASES****9**

Distributed databases, Spatial Databases, Temporal Databases, XML Databases, Multimedia Databases.

**TOTAL :45 PERIODS****COURSE OUTCOMES:**

At the end of the course, students would:

CO #	STATEMENT	RBT LEVEL
1.	Demonstrate the knowledge on basic elements of different data models and normalize the given relation.	AP
2.	Construct SQL queries for a given application.	AP
3.	Illustrate transaction processing and concurrency control concepts and manage transactions.	AP
4.	Examine the basic database storage structures and access techniques.	AN
5.	Analyze the recent advancements in databases and design database for real world applications.	AN

**TEXTBOOKS:**

- 1 Ramez Elmasri, Shamkant B. Navathe, Fundamentals of Database Systems, Seventh Edition, Pearson Education, 2016.

**REFERENCE BOOKS:**

- 1 Abraham Silberschatz, Henry F. Korth, S. Sudharshan, Database System Concepts, Sixth Edition, Tata McGraw Hill, 2010.
- 2 Raghu Ramakrishnan, Johannes Gehrke Database Management Systems, Fourth Edition, Tata McGraw Hill, 2010.
- 3 G.K.Gupta, Database Management Systems, Tata McGraw Hill, 2011.
- 4 Carlos Coronel, Steven Morris, Peter Rob, Database Systems: Design, Implementation and Management, Ninth Edition, Cengage Learning.
- 5 Bipin Desai, An Introduction to Database Systems, Galgotia .
- 6 Pang, N. T., Steinbach, M. and Kumar, V., "Introduction to Data Mining", Pearson Education.

**COURSE ARTICULATION MATRIX**

COs	PO												PSO's	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1.	1	2		2	1					1		1		
2.	2	2	2	2	3					1		1	2	
3.	2			1								1		
4.			1	2								1		
5.	2		3	1	3	2	2	1	2		1			2



**OBJECTIVES:**

The Students should be made to:

- To understand various number systems, different methods used for the simplification of Boolean functions.
- To design and implement a system that uses combinational logic for the given specification; Simulate combinational logic systems using verilog or VHDL.
- To design and implement synchronous sequential system for the given specification; Simulate sequential logic systems using verilog or VHDL.
- To understand encoding and decoding of digital data streams.
- To have a detailed knowledge of compression and decompression techniques.

**UNIT – I      BOOLEAN ALGEBRA AND LOGIC GATES      9**

Review of Number Systems – Arithmetic Operations – Binary Codes – Boolean algebra and Theorems – Boolean Functions - Logic Gates – Simplification of Boolean Functions usingKarnaugh Map and Tabulation Methods-NAND & NOR Implementation

**UNIT – II      COMBINATIONAL CIRCUITS      9**

Combinational Circuits – Analysis and Design Procedures – Circuits for Arithmetic Operations, Code Conversion – Decoders and Encoders – Multiplexers and De-multiplexers – Tri-State Gates–Introduction to HDL programs.

**UNIT – III      SYNCHRONOUS SEQUENTIAL LOGIC      9**

Latches and Flip Flops–S-R Flipflop,J-KFlipflop,T Flipflop,D Flipflop,Master-Slave JK Flipflop–Analysis and Design Procedures –Shift Registers – Counters –State Diagram, State Table, State Assignment & Minimization.

**UNIT – IV      INFORMATION ENTROPY FUNDAMENTALS      9**

Uncertainty, Information and Entropy – Source coding Theorem – Huffman coding –Shannon Fano coding– Mutual Information–Channel capacity-Binary Symmetric Channel-Binary Erasure Channel-channel coding Theorem – Channel capacity Theorem.

**UNIT – V      AUDIO AND VIDEO CODING      9**

Linear Predictive coding – code excited LPC – Perceptual coding, MPEG audio coders – Dolby audio coders – Video compression – Principles – Introduction to H.261 & MPEG-1,2,3,4 Video standards.

**TOTAL :45 PERIODS****COURSE OUTCOMES:**

At the end of the course, students would:

CO #	STATEMENT	RBT LEVEL
1.	Perform arithmetic operations in any number system & to simplify the Boolean expression using K –Map and Tabulation techniques.	AP
2.	Design and analysis of a given digital Combinational circuit	AN
3.	Design and analysis of a given digital Sequential hardware circuit.	AN
4.	Analyse channel capacity for various channels and to generate codewords for different media elements.	AN
5.	To analyze the performance of audio and video coders.	AN

**TEXTBOOKS:**

- 1 Morris Mano M and Michael D. Ciletti, "Digital Design with An Introduction to Verilog HDL", 5th edition, Pearson Education India, 2013.
- 2 Simon Haykin, "Communication Systems", John Wiley and Sons, 4th Edition, 2004.
- 3 Khalid Sayood, "Introduction to Data Compression", Fifth Edition, Elsevier, 2017.

**REFERENCE BOOKS:**

- 1 Fred Halsall, "Multimedia Communications, Applications Networks Protocols and Standards", Pearson Education, Asia 2002.
- 2 R Bose, "Information Theory, Coding and Cryptography", Fifth Edition, Tata Mcgraw Hill, 2009.
- 3 John F. Wakerly, "Digital Design Principles and Practices", Fourth Edition, Pearson Education, 2007.
- 4 Charles H. Roth Jr, "Fundamentals of Logic Design", Fifth Edition, Jaico Publishing House, Mumbai, 2003.

**COURSE ARTICULATION MATRIX**

COs	PO												PSO's	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1.	2	3	1	2	2	1	1	1	1	2	1	3	1	1
2.	1	2	1	2	2	0	0	1	1	1	1	2	1	1
3.	2	3	1	2	3	0	1	1	1	1	1	2	1	1
4.	2	1	2	1	1	0	1	1	2	1	1	2	1	1
5.	1	2	1	2	2	1	1	1	1	2	1	2	1	1

**OBJECTIVES:**

The Students should be made to:

- To know the difference between data and information.
- To introduce the concept of Internet, Networks and its working principles.
- To know the scripting languages.
- To understand various applications related to Information Technology.

**UNIT – I INFORMATION SYSTEMS****6+4**

Data and Information - Types of Data - Acquisition of Text and Image - Textual data - Storage formats - Image Compression - Acquisition of Audio - Acquiring and Storing audio signals - Audio compression techniques - Acquisition of Video - Compression of video data - Internet Application - E-commerce - Business Information Systems.

Suggested Activities: Demonstrate the working of an E-commerce applications.

**UNIT – II NETWORKING ESSENTIALS****6+4**

Fundamental computer network concepts - Types of computer networks - Network topologies - Components of network - Network layers - OSI Model - TCP/IP Model - Wireless local area network - Ethernet - WiFi Technologies - Bluetooth - Network Routing - Routing techniques - Switching. - Switching techniques.

Suggested Activities: Set up a simple network topology using NS2 simulation tool.

**UNIT – III MOBILE COMMUNICATION ESSENTIALS****6+4**

Cell phone working fundamentals - GSM - Mobile services - Architecture - Entities - Call routing - CDMA - Features of CDMA - Cell phone frequencies and channels - Digital cell phone components - Generations of cellular networks - Cell phone network technologies/architecture - Voice calls & SMS.

Suggested Activities - Develop simple mobile applications using Android Studio.

**UNIT – IV WEB ESSENTIALS****6+9**

Creating a Website - Working principle of a website - Markup Languages: HTML. An Introduction to HTML History - Versions - Basic HTML Syntax and Semantics - Some Fundamental HTML Elements - Relative URLs Lists - tables - Frames - Forms - HTML 5.0 - Style Sheets: CSS - Introduction to Cascading Style Sheets – Features - Core Syntax - Authoring tools - Types of servers: Application Server – Web Server - Database Server. Suggested Activities: Develop static and interactive web pages using HTML and Authoring tools.

**UNIT – V SCRIPTING ESSENTIALS****6+9**

Need for Scripting languages - Types of scripting languages - Client side scripting - Syntax - Variables and Data Types - Statements - Operators - Literals - Functions - Objects - Arrays - Built - in Objects - Server side scripting - PHP - Working principle of PHP - PHP Variables - Constants - Operators – Flow Control and Looping - Arrays - Strings - Functions - File Handling - PHP and MySQL - PHP and HTML - Cookies - Simple PHP scripts.

Suggested Activities: Incorporate dynamism in websites using PHP scripts.

**TOTAL :L:30+P:30=60 PERIODS**

## COURSE OUTCOMES:

At the end of the course, students would:

CO #	STATEMENT	RBT LEVEL
1.	Analyse the various information systems and technologies to improve an organization's performance.	AN
2.	Demonstrate the use of networking concepts to develop a simple network.	AP
3.	Apply the cellular radio concepts and standards in real time applications.	AP
4.	Design and Deploy web based applications.	C
5.	Develop dynamic and interactive Web pages using scripting languages.	C

## TEXTBOOKS:

- 1 V. Rajaraman, "Introduction to Information Technology", PHI Learning , Second Edition, 2013.
- 2 Robin Nixon, "Learning PHP, MySQL, JavaScript, CSS & HTML5" Third Edition, O'REILLY, 2014.
- 3 James F. Kurose, —Computer Networking: A Top-Down Approach, Sixth Edition, Pearson, 2012.

## REFERENCE BOOKS:

- 1 GottapuSasibhushana Rao, "Mobile Cellular Communication", Pearson, 2012.4. Reema Thareja, "Programming in C", 2nd ed., Oxford University Press, 2016.
- 2 R. Kelly Rainer , Casey G. Cegielski , Brad Prince, Introduction to Information Systems, Fifth Edition, Wiley Publication, 2014.

## LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

**SOFTWARE:** Java, MySQL or Equivalent, Apache Server, Android SDK.

**HARDWARE:** Standalone desktops 30 Nos

## COURSE ARTICULATION MATRIX

COs	PO												PSO's	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1.	3	2	3	2	1	0	1	1	0	2	0	2	3	2
2.	3	2	2		3	0	0	1	0	0	0	0	2	2
3.	3	2	3	1	3	2	2	1	2	0	0	2	3	3
4.	3	2	3	1	3	0	0	1	2	0	3	0	2	3
5.	3	2	3	1	3	0	2	1	2	0	3	0	2	3

**OBJECTIVES:**

The Students should be made to:

- To demonstrate arrays and structure in C.
- To demonstrate operations in linear and non-linear data structures.
- To demonstrate applications of stacks and queues.
- To demonstrate applications of graphs.
- To demonstrate various sorting, searching, and hashing algorithms.

**List of Experiments**

- 1 Implementation of problems on Arrays and structures.
- 2 Implementation of Singly Linked List operations: Creation, insertion, deletion, search, middle element, reverse, merge.
- 3 Implementation of Doubly Linked List operations on an application: Creation, insertion, deletion, search, middle element, reverse, merge.
- 4 Implementation of Circular Linked List operations on an application.
- 5 (a) Implementation of Stack operations  
(b) Application of Stack – Expression conversion
- 6 Implementation of Circular Queue operations on a dragon wheel.
- 7 Implementation of Binary search Tree operations on an application.
- 8 Implementation of AVL Tree operations on an application.
- 9 Implementation of Dijkstra's algorithm for Single Source Shortest Path problem.
- 10 Implementation of Minimal Spanning Tree algorithms.
- 11 Implementation of insertion sort, Heap Sort on an application.
- 12 Implementation of Hash Table on an application.

**TOTAL :45 PERIODS****COURSE OUTCOMES:**

At the end of the course, students would:

CO #	STATEMENT	RBT LEVEL
1.	Implement algorithms using arrays and structures.	AP
2.	Implement operations in linear and non-linear data structures.	AP
3.	Apply linear and non-linear data structures to real-time applications.	AP
4.	Implement graph algorithms.	AP
5.	Apply the various sorting, searching and hashing algorithms.	AP

### REFERENCE BOOKS:

- 1 Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", 2e Pearson Education.
- 2 Mark Allen Weiss, "Data Structures and Algorithm Analysis in C++", 3e Pearson Education.
- 3 Thomas H Cormen et al, "Introduction to Algorithms", 3e The MIT Press.

### LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

Standalone desktops with C compiler 30 Nos.

Or

Server with C compiler supporting 30 terminals or more.

### COURSE ARTICULATION MATRIX

COs	PO												PSO's	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1.	2	2	2	2	0	0	0	0	1	1	1	2	1	1
2.	1	2	1	2	0	0	0	0	1	1	1	1	1	1
3.	2	3	1	2	0	0	0	0	1	1	2	2	1	1
4.	3	1	3	3	0	0	0	0	1	1	2	2	1	1
5.	1	2	1	2	0	0	0	0	1	1	2	2	1	1

**OBJECTIVES:**

The Students should be made to:

- To understand data definitions and data manipulation commands
- To learn the use of nested and join queries
- To understand functions, procedures and procedural extensions of data bases
- To be familiar with the use of a front end tool
- To understand design and implementation of typical database applications.

**List of Experiments**

- 1 Database Design using ER modeling tool
- 2 Data Definition Commands, Data Manipulation Commands for inserting, deleting, updating and retrieving Tables and Transaction Control statements
- 3 Database Querying – Simple queries, Nested queries, Sub queries and Joins
- 4 Views, Sequences, Synonyms
- 5 Database Programming: Implicit and Explicit Cursors
- 6 Procedures and Functions
- 7 Triggers
- 8 Exception Handling
- 9 Normalization for any application
- 10 Database Connectivity with Front End Tools
- 11 Mini Project using real life database applications

**TOTAL :45 PERIODS**

**COURSE OUTCOMES:**

At the end of the course, students would:

CO #	STATEMENT	RBT LEVEL
1.	Design and implement a database schema for a given problem domain.	AP
2.	Create and maintain tables.	AP
3.	Analyze the database using queries to retrieve records.	AP
4.	Investigate an information storage problem and derive an information model.	AN
5.	Create real life database applications.	C

**REFERENCE BOOKS:**

- 1 Abraham Silberschatz, Henry F. Korth, S. Sudharshan, Database System Concepts, Sixth Edition, Tata McGraw Hill, 2010.
- 2 Raghu Ramakrishnan, Johannes Gehrke Database Management Systems, Fourth Edition, Tata Mc Graw Hill, 2010.
- 3 G.K.Gupta, TDatabase Management Systems, Tata McGraw Hill, 2011.

**LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:****HARDWARE:**

Standalone desktops 30 Nos.

(or)

Server supporting 30 terminals or more.

**SOFTWARE:**

Front end: VB/VC ++/JAVA or Equivalent

Back end: Oracle / SQL / MySQL/ PostGress / DB2 or Equivalent

**COURSE ARTICULATION MATRIX**

COs	PO												PSO's	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1.	1	2	0	2	1	0	0	0	0	1	0	1	0	0
2.	2	2	2	2	3	0	0	0	0	1	0	1	2	0
3.	2	0	0	1	0	0	0	0	0	0	0	1	0	0
4.	0	0	1	2	0	0	0	0	0	0	0	1	0	0
5.	2	0	3	1	3	2	2	1	2	0	1	0	0	2



**OBJECTIVES:**

The Students should be made to:

- To be an adjunct to the “Digital Principles and System design” Course through hands-on experience with design, construction, and implementation of digital circuits like combinational /sequential.
- To provide the capability to understand and to simulate digital circuits through Xilinx.
- Explore digital communications models using MATLAB/ SCILAB / Equivalent).

**List of Experiments**

- 1 Study of logic gates.
- 2 Verification of Boolean theorems.
- 3 Combinational circuits-Implementation of arbitrary functions and code converters.
- 4 Design and implementation of Binary adder/subtractor.
- 5 Design and implementation of Parity generator/checker.
- 6 Design and implementation of magnitude comparator.
- 7 Design and implementation of applications using multiplexers.
- 8 Study and Implementation of Flip-Flops.
- 9 Design and implementation of shift registers.
- 10 Design and implementation of synchronous counters.
- 11 Amplitude modulation and demodulation Simulation using MATLAB / SCILAB / Equivalent).
- 12 Frequency modulation and demodulation Simulation using MATLAB / SCILAB / Equivalent).

**TOTAL :45 PERIODS****COURSE OUTCOMES:**

At the end of the course, students would:

CO #	STATEMENT	RBT LEVEL
1.	Enumerate the working of various logic gates.	AP
2.	Enumerate the various combinational circuits and their applications.	AP
3.	Design various building blocks of digital computers.	AP
4.	Enumerate the basic elements of analog and digital communication systems.	AP
5.	To analyze the performance of audio and video coders.	AP

**REFERENCE BOOKS:**

- 1 Fred Halsall, “Multimedia Communications, Applications Networks Protocols and Standards”,

Pearson Education, Asia 2002.

2 R Bose, "Information Theory, Coding and Cryptography", Fifth Edition, Tata Mcgraw Hill, 2009.

3 John F. Wakerly, "Digital Design Principles and Practices", Fourth Edition, Pearson Education, 2007.

4 Charles H. Roth Jr, "Fundamentals of Logic Design", Fifth Edition, Jaico Publishing House, Mumbai, 2003.

#### LIST OF EQUIPMENT FOR A BATCH OF 30 STUDENTS:

1. Digital Trainer Kits
2. Bread board and components
3. PC s – 10Nos.
4. IC tester-1
5. MATLAB / SCILAB for simulation experiments.

#### COURSE ARTICULATION MATRIX

COs	PO												PSO's	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
1.	2	3	1	2	2	1	1	1	1	2	1	3	1	1
2.	1	2	1	2	2	0	0	1	1	1	1	2	1	1
3.	2	3	1	2	3	0	1	1	1	1	1	2	1	1
4.	2	1	2	1	1	0	1	1	2	1	1	2	1	1
5.	1	2	1	2	2	1	1	1	1	2	1	2	1	1

<b>MA22454</b>	<b>PROBABILITY AND QUEUEING THEORY</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>(Common to CSE &amp; INT)</b>	<b>3</b>	<b>1</b>	<b>0</b>	<b>4</b>

### Objectives

- To perform probability calculations for discrete and continuous random variables.
- To categorize discrete and continuous distributions by learning their properties.
- To compute and interpret correlation coefficient and regression describing association between two variables.
- To expose the fundamental concepts of random processes and related structures.
- To describe various key features of queuing systems.

### **UNIT-I PROBABILITY AND RANDOM VARIABLES (9+3)**

Notion of Probability – Conditional Probability - Baye's Theorem - Random Variables - Discrete and Continuous Random Variables – Moments – Moment generating functions.

### **UNIT-II SPECIAL DISTRIBUTIONS (9+3)**

Discrete Distributions - Binomial, Poisson, Geometric, Hypergeometric Distributions; Continuous Distributions - Uniform, Exponential, Gamma, Weibull and Normal Distributions and their properties.

### **UNIT-III TWO - DIMENSIONAL RANDOM VARIABLES (9+3)**

Joint distributions – Marginal and Conditional distributions – Covariance – Correlation and Regression for two variables– Transformation of random variables – Central Limit Theorem.

### **UNIT IV RANDOM PROCESS (9+3)**

Definition - Classification – Poisson Process – Markov Process – Discrete parameter Markov Chain – Chapman Kolmogorov equations – Limiting distributions - Birth and Death Processes.

### **UNIT-V QUEUEING SYSTEMS (9+3)**

Characteristics of queuing systems - Little's Formula - Markovian queues – Single and multiple server queueing models – Queues with finite waiting rooms - Finite source models – Non-Markovian queues - M/G/1 queue – PollaczekKhinchin formula .

**TOTAL (L:45+T:15):60 PERIODS**

**OUTCOMES:**

CO#	Course Outcomes	RBT Level
1	Extend and formalize the knowledge of probability theory and random variables.	AP
2	Describe commonly used univariate discrete and continuous probability distributions and apply various distributions to solve real world problems.	AP
3	Identify various distribution functions and acquire skills in handling situations involving more than one variable.	AP
4	Analyse various classifications of Random Processes and characterize phenomena which evolve with respect to time in a probabilistic manner.	AP
5	Understand the basic characteristic features of a queuing system and acquire skills in analyzing queuing models.	AP

**TEXT BOOKS:**

1. Ibe. O.C., "Fundamentals of Applied Probability and Random Processes", Elsevier, 1st Edition Indian Reprint, 2010.
2. Gross. D. and Harris. C.M., "Fundamentals of Queueing Theory", Wiley Student edition, 2013.

**REFERENCES:**

1. Robertazzi, "Computer Networks and Systems: Queueing Theory and Performance Evaluation", Springer, 3rd Edition, Reprint 2011.
2. Taha H.A., "Operations Research", Pearson Education, Asia, 10th Edition, 2019.
3. Veerarajan. T, "Probability, Statistics and Random Processes", McGraw Hill Publishers, 3rd Edition, 2013.
4. Hwei Hsu, "Schaum's Outline of Theory and Problems of Probability, Random Variables and Random Processes", Tata McGraw Hill Edition, New Delhi, 2013.
5. Yates R.D. and Goodman. D. J., "Probability and Stochastic Processes", Wiley India Pvt. Ltd., Bangalore, 2nd Edition, 2012.

**WEBLINKS:**

1. <https://www.analyticsvidhya.com/blog/2016/04/predict-waiting-time-queueing-theory/>  
<https://www.informit.com/articles/article.aspx?p=1863432&seqNum=3>

**COURSE ARTICULATION MATRIX:**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO-1	PSO-2
CO1	3	3	2	-	-	-	-	-	-	-	-	2	-	-
CO2	3	3	2	-	-	-	-	-	-	-	-	2	-	-
CO3	3	3	2	2	-	-	-	-	-	-	-	2	-	-
CO4	3	3	2	2	-	-	-	-	-	-	-	2	-	-
CO5	3	3	2	2	2	-	-	-	-	-	-	2	-	-



GE22451

**ENVIRONMENTAL SCIENCES AND  
SUSTAINABILITY**

**L T P C  
3 0 0 3**

**(Common to all Branches)**

**Objectives**

1. To introduce the basic concepts of environment, ecosystems and biodiversity and emphasize the biodiversity of India and its conservation.
2. To impart knowledge on the causes, effects and control or prevention measures of environmental pollution.
3. To study and understand the various types of renewable sources of energy and their applications.
4. To familiarize the concept of sustainable development goals, economic and social aspects of sustainability, recognize and analyze climate changes, and environmental management challenges.
5. To inculcate and embrace sustainability practices, develop a broader understanding of green materials and energy cycles, and analyze the role of sustainable urbanization.

**UNIT I ENVIRONMENT AND BIODIVERSITY 9**

Definition, scope and importance of environment – need for public awareness. Eco-system and Energy flow– food chains, food webs and ecological pyramids, ecological succession. Biodiversity- types- genetic, species and ecosystem diversity– values of biodiversity, India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: fragmentation and habitat loss, poaching of wildlife, human-wildlife conflicts – endangered and endemic species of India –conservation of biodiversity: In-situ and ex-situ.

**UNIT II ENVIRONMENTAL POLLUTION 9**

Definition, causes, effects and preventive measures of air, water and soil pollution. Marine and thermal pollution - causes, effects and control measures. Light and noise pollution - effect on flora and fauna. Nuclear pollution- Sources, effects and control measures. Disposal of radioactive wastes (Nuclear hazards). Pollution case studies. Role of an individual in the prevention of pollution. Solid, hazardous and E-waste management. Occupational health and safety management system (OHASMS). Environmental protection, Environmental protection acts, categorization of species according to IUCN.

**UNIT III RENEWABLE SOURCES OF ENERGY 9**

Energy resources: Growing energy needs, Nonrenewable resources – types, uses. Energy management and conservation - New energy sources, Need of new sources - geo suitability of establishing renewable energy sources, different types new energy sources. Applications of hydrogen energy, ocean energy resources, Tidal energy conversion. Concept, origin and power plants of geothermal energy. Role of an individual in conservation of energy.

**UNIT IV SUSTAINABILITY AND MANAGEMENT 9**

Development, GDP, Sustainability- concept, needs and challenges-economic, social and aspects of sustainability-from unsustainability to sustainability-millennium development goals, and protocols, Sustainable Development Goals-targets, indicators and intervention areas - Principles of green chemistry, Climate change- Global, Regional and local environmental issues and possible solutions-case studies - Role of non-governmental organization, Concept of carbon credit, carbon footprint - Environmental management in industry - A case study

## UNIT V SUSTAINABILITY PRACTICES

9

Zero waste and R concept, circular economy, ISO 18000 series, material life cycle assessment, environmental impact assessment. Wasteland reclamation, Sustainable habitat: green buildings, green materials, energy efficiency and energy audit, sustainable transports. Energy cycles, carbon cycle, emission and sequestration, Green engineering: sustainable urbanization- socio-economical and technological change. Rainwater harvesting, watershed management, environmental ethics: Issues and possible solutions.

**TOTAL :45 PERIODS**

### OUTCOMES:

CO#	Course Outcomes	RBT Level
1	Explain the fundamental role of ecosystems and biodiversity and discuss the importance of their conservation.	U
2	Describe the different types of pollution, their effects and strategies to minimize or eliminate pollution.	U
3	Identify the need of renewable and non-renewable resources and describe energy management measures to preserve them for future generations.	U
4	Explain the various goals of sustainable development applicable for suitable technological advancement and societal development.	U
5	Demonstrate the knowledge of sustainability practices and identify green materials, energy cycles and the role of sustainable urbanization.	U

### TEXT BOOKS:

1. Anubha Kaushik and C. P. Kaushik's "Perspectives in Environmental Studies", 7th Edition, New Age International Publishers, 2022.
2. Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, 2016.
3. Gilbert M. Masters, 'Introduction to Environmental Engineering and Science', 2nd edition, Pearson Education, 2004.
4. Allen, D. T. and Shonnard, D. R., Sustainability Engineering: Concepts, Design and Case Studies, Pearson. 2011.
5. Bradley. A.S; Adebayo, A.O., Maria, P. Engineering applications in sustainable design and development, CL Engineering, 2015.
6. Environment Impact Assessment Guidelines, Notification of Government of India, 2006.
7. Mackenthun, K.M., Basic Concepts in Environmental Management, Lewis Publication, London, 1998.

### REFERENCES:

1. R.K. Trivedi, 'Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards', Vol. I and II, Enviro Media. 38

2. Cunningham, W.P. Cooper, T.H. Gorhani, 'Environmental Encyclopedia', Jaico Publ., House, Mumbai, 2001.
3. Dharmendra S. Sengar, 'Environmental law', Prentice hall of India PVT. LTD, New Delhi, 2007.
4. Rajagopalan, R, 'Environmental Studies-From Crisis to Cure', Oxford University Press, 3rd edition, 2015.
5. Erach Bharucha "Textbook of Environmental Studies for Undergraduate Courses" Orient Blackswan Pvt. Ltd. 3rd edition, 2021.

**COURSE ARTICULATION MATRIX:**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO-1	PSO-2
CO1	3	-	-	-	-	3	3	2	-	2	-	1	-	-
CO2	3	-	-	-	-	3	3	2	-	2	-	2	-	-
CO3	3	-	1	-	-	3	3	1	-	2	-	1	-	-
CO4	3	-	-	-	-	3	3	3	-	2	-	2	-	-
CO5	3	-	-	-	-	3	3	3	-	2	-	2	-	-



**IT22401**

**OPERATING SYSTEM CONCEPTS**

L T P C  
3 0 0 3

**Objectives:**

- To understand the basic concepts and functions of operating systems.
- To analyze Scheduling algorithms
- To understand the concept of Deadlocks.
- To analyze various memory management and storage management schemes.
- To be familiar with the basics of Linux system, Windows and Mobile OS.

**Unit 1 Operating Systems Overview 9**

Computer System - Elements and organization; Operating System- Overview - Objectives and Functions – Evolution- Structures –Services - User Operating System Interface - System Calls – System Programs - Design and Implementation - Structuring methods.

**Unit 2 Process Management 9**

Processes - Concept - Scheduling - Operations; Inter-process Communication; CPU Scheduling - Criteria & Algorithms; Threads - Multithread Models – Threading issues; Process Synchronization - The critical-section problem - Synchronization hardware – Semaphores – Mutex - Classical problems of synchronization - Monitors; Deadlock - Methods for handling deadlocks, Prevention, Avoidance, Detection & Recovery

**Unit 3 Memory Management 9**

Main Memory - Swapping - Contiguous Memory Allocation –Paging - Structure of the Page Table - Segmentation, Segmentation with paging; Virtual Memory - Demand Paging – Copy on Write - Page Replacement - Allocation of Frames –Thrashing.

**Unit 4 Storage Management 9**

Mass Storage system – Disk Structure - Disk Scheduling and Management; File-System Interface - File concept - Access methods - Directory Structure & organization - File system - mounting, Sharing , Protection, Implementation & Structure - Directory implementation - Allocation Methods - Free Space Management; I/O Systems –Hardware, Application interface, Kernel subsystem.

**Unit 5 Case Study 9**

Linux, Windows, iOS and Android: History- Design principles – Kernel modules – Process management – Scheduling – Memory management – File systems – Input and output – Inter Process Communication – Network structure – Security

Total (L:45)

**OUTCOMES:**

CO#	Course Outcomes	RBT Level
1	Understand the basic concepts and functions of operating systems.	U
2	Apply the concepts of process synchronization and inter process communication.	AP
3	Evaluate the performance of CPU Scheduling Algorithms, Deadlock Algorithms and Memory Management Algorithms.	E
4	Analyze the functionality of file systems and diverse disk management techniques.	AN
5	Assess the performance of various operating systems.	E

**TEXT BOOKS:**

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, “Operating System Concepts”, 10<sup>th</sup> Edition, John Wiley and Sons Inc.
2. Andrew S Tanenbaum, "Modern Operating Systems", Pearson, 5<sup>th</sup> Edition.

**REFERENCES:**

1. Charles Crowley, “Operating Systems: A Design-Oriented Approach”, Tata McGraw Hill Education”.
2. D M Dhamdhare, “Operating Systems: A Concept-based Approach”, Tata McGraw-Hill Education, Eighth Edition.
3. William Stallings, “Operating Systems: Internals and Design Principles”, Prentice Hall, Seventh Edition.
4. Reto Meier, John Wiley and sons, “Professional Android 4 Application Development”.

**COURSE ARTICULATION MATRIX**

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.	3	1	2	2	-	-	1	-	3	2	3	1	2	3
2.	2	2	3	1	1	1	-	-	2	1	1	2	2	3
3.	1	3	2	2	1	-	-	-	2	2	1	1	2	3
4.	1	3	3	3	-	-	-	-	1	2	1	2	3	3
5.	3	1	2	1	3	-	1	1	3	2	3	2	3	2

<b>IT22402</b>	<b>MICROPROCESSOR AND MICROCONTROLLER</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>INTERFACING</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Objectives:**

- Study the Architecture of 8086 microprocessor.
- Learn the design aspects of I/O and Memory Interfacing circuits.
- Study about communication and bus interfacing
- Study the Architecture of 8051 microcontroller.

**Unit 1 THE 8086 MICROPROCESSOR 9**

Introduction to 8086 – Microprocessor architecture – Addressing modes - Instruction set and assembler directives – Assembly language programming – Modular Programming - Linking and Relocation - Stacks - Procedures – Macros – Interrupts and interrupt service routines – Byte and String Manipulation.

**Unit 2 8086 SYSTEM BUS STRUCTURE 9**

8086 signals – Basic configurations – Pins in 8086--System Bus architecture using 8086 – Introduction to Multiprogramming – System Bus Structure – Multiprocessor configurations

**Unit 3 8086 INTERFACING 9**

Memory Interfacing and I/O interfacing - Parallel communication interface – Serial communication interface – D/A and A/D Interface - Timer – Keyboard /display controller – Interrupt controller – DMA controller.

**Unit 4 THE 8051 MICROCONTROLLER 9**

Architecture of 8051 – Special Function Registers(SFRs) - I/O Pins Ports and Circuits – Instruction set – Addressing modes - Assembly language programming.

**Unit 5 8051 INTERFACING and ARM Processor 9**

Programming 8051 Timers - Serial Port Programming - Interrupts Programming – LCD & Keyboard Interfacing –ADC&DACInterfacing- Stepper Motor Interfacing-ARM Design Philosophy,Overview of ARM architecture-States [ARM, Thumb, Jazelle].

Total (L:45)

**OUTCOMES:**

CO#	Course Outcomes	RBT Level
1	Develop and implement programs on 8086 microprocessor.	AP
2	Interpret I/O circuits.	AN
3	Build Memory Interfacing circuits.	AP
4	Develop and implement 8051 microcontroller based systems	AP
5	Interpret on 8051 interfaces and understand about ARM Processor.	AN

**TEXT BOOKS:**

1. Yu-Cheng Liu, Glenn A.Gibson, —Microcomputer Systems: The 8086 / 8088 Family - Architecture, Programming and Design, Second Edition, Prentice Hall of India, 2007.
2. Mohamed Ali Mazidi, Janice Gillispie Mazidi, Rolin McKinlay, —The 8051 Microcontroller and Embedded Systems: Using Assembly and C, Second Edition, Pearson Education, 2011.

**REFERENCES:**

1. Douglas V.Hall, —Microprocessors and Interfacing, Programming and Hardware:,TMH, 2012.

**COURSE ARTICULATION MATRIX**

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.	3	2	2	3	2	1	1	-	-	-	-	-	-	2
2.	3	2	2	2	2	-	-	-	-	-	-	-	-	-
3.	3	2	2	2	2	-	-	-	-	1	-	-	-	2
4.	3	2	2	2	2	1	-	-	-	-	-	-	-	2
5.	3	2	2	2	2	-	-	-	-	1	-	-	-	2

IT22408

**PARADIGMS OF ALGORITHM DESIGN:  
THEORY & PRACTICES**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
2	0	2	3

**Objectives:**

- To learn about the process of problem solving.
- To be conversant with algorithms for common problems.
- To analyse the algorithms for time/space complexity.
- To learn to write algorithms for a given problem using different design paradigms.
- To understand computational complexity of problems.

**Unit 1 INTRODUCTION**

**6+6**

Overview of Algorithms - Definition, characteristics, and types, real-world applications - Algorithm Analysis Basics - Time and space complexity - Asymptotic notations (Big O, Omega, Theta). Brute Force Algorithms - Exhaustive search techniques - Examples and applications

Suggested Activity (not limited to)

Implement on various input sizes (n) and plot a graph for n Vs time taken

1. Problems on linear and quadratic time complexities ex: Linear Search, matrix operations
2. Selection Sort
3. Insertion Sort
4. Bubble Sort

**Unit 2 Recursion and Backtracking**

**6+6**

Recursive Functions-Recursion and Memory, Recursion vs Iteration, Recurrence Relation. Backtracking-Strategy, problems.

Suggested Activity (not limited to)

Implement on various input sizes (n) and plot a graph for n Vs time taken

1. Checking for ascending order of array
2. Reversing a singly linked list
3. Heap sort.
4. kth smallest/largest element in Binary Search Tree
5. N-Queens Problem
6. Sum of Subsets

### **Unit 3 Divide & Conquer and Greedy Approaches**

**6+6**

Divide and Conquer Technique - Strategy-Recurrence equation for divide and conquer- Application. Greedy Algorithm- Strategy, problems

Suggested Activity (not limited to)

Implement on various input sizes (n) and plot a graph for n Vs time taken

1. Binary Search
2. Merge Sort
3. Quick Sort
4. Pairwise multiplication of elements (Greedy)
5. Fractional Knapsack Problem (Greedy)
6. Minimal Spanning Tree

### **Unit 4 Dynamic Programming**

**6+6**

Introduction to Dynamic Programming - Principles and applications -Memoization and Tabulation - Techniques for optimization - Analysis of DP algorithms- Applications of Dynamic Programming.

Suggested Activity (not limited to)

Implement on various input sizes (n) and plot a graph for n Vs time taken

1. Fibonacci sequence
2. Binomial Co. efficient
3. Longest Common Subsequence
4. Matrix Chain Multiplication
5. Travelling Salesman problem
6. Hamiltonian cycles
7. 0/1 Knapsack Problem

### **Unit 5 NP Completeness**

**6+6**

Understanding of Computational Complexity – Tractable and Intractable Problems - P, NP-Hard, NP Complete problems – Bin Packing problem - Reducibility – Approximation algorithms - TSP – Randomized Algorithms - Randomized Quick Sort

Suggested Activity

Mini Project

Total (L:30+P:30)60 Periods

## OUTCOMES:

CO#	Course Outcomes	RBT Level
1	Articulate the process of problem solving and writing algorithms.	AP
2	Analyze recursive and non-recursive algorithms	AN
3	Apply different algorithmic design techniques to solve computational problems	AP
4	Evaluate the effectiveness of a solution by comparing the various approaches.	E
5	Explain the limitations of computing power and solve problems using Approximation and randomized algorithms	AP

## TEXT BOOKS:

1. NarasimaKarumanchi, "Algorithm Design Techniques: Recursion, Backtracking, Greedy, Divide and Conquer, and Dynamic Programming", CareerMonk Publications, 2018
2. T. H. Cormen, C. E. Leiserson, R. L. Rivest and C. Stein, "Introduction to Algorithms", PHI Learning Private Limited, 2012.

## REFERENCES:

1. Richard E Napolitan., Foundations of Algorithms, Fifth Edition, Jones and Bartlett Publishers
2. Design and Analysis of Algorithms, S. Sridhar, Oxford Univ.Press,2014

## List of equipment for a batch of 30 students:

### SOFTWARE:

C/C++/Java

### HARDWARE:

Standalone desktops with Windows 7 or higher.

## COURSE ARTICULATION MATRIX

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.	3	3	1	1	1	1	1	1	3	2	-	3	3	3
2.	3	3	1	2	3	1	1	-	2	1	-	3	3	3
3.	1	3	3	3	3	1	1	1	3	-	2	3	3	3
4.	3	3	3	3	3	1	1	-	2	2	1	3	3	3
5.	3	3	3	3	2	1	1	1	1	2	2	3	3	3

<b>IT22409</b>	<b>SOFTWARE ENGINEERING METHODOLOGIES:</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>THEORY &amp; PRACTICES</b>	<b>2</b>	<b>0</b>	<b>2</b>	<b>3</b>

Objectives:

- To understand the roles of software process
- To understand how an iterative, incremental development process leads to faster delivery of more useful software.
- To understand the essence of agile development methods

**Unit 1 SOFTWARE PROCESS AND SOFTWARE REQUIREMENT ANALYSIS 6+4**

Generic process model, Prescriptive Process models, Software Requirements: Functional and Non-Functional, User requirements, System requirements, Software Requirements Document – Requirement Engineering Process.

**Suggested Activity (not limited to)**

1. Identify a software system that needs to be developed.
2. Document the Software Requirements Specification (SRS) for the Identified system.

**Unit 2 SOFTWARE DESIGN 6+9**

System Modeling - Context models, Interaction models, Structural models, Behavioral models, Model driven engineering, - context diagram, class diagram, sequence diagram, interaction diagram, communication diagram, state chart diagram.

**Suggested Activity (not limited to)**

1. Identify use cases and develop the Use Case model.
2. Identify the conceptual classes and develop a Domain Model and also derive a Class Diagram from that.
3. Using the identified scenarios, find the interaction between objects and represent them using UML Sequence and Collaboration Diagrams.
4. Draw relevant State Chart and Activity Diagrams for the same system.

**Unit 3 ARCHITECTURAL DESIGN 6+9**

Introduction - Architectural views-Architectural patterns-Application architecture- Data processing systems, Transaction processing systems, Event processing systems, Language processing systems, User Interface Design: Interface analysis, Interface Design. **Testing throughout the Software Life Cycle.**

**Suggested Activity (not limited to)**

1. Implement the system as per the detailed design
2. Test the software system for all the scenarios identified as per the use case diagram



**Unit 4 AGILE PRODUCT MANAGEMENT WITH SCRUM**

6+4

Agile methods - Agile development techniques - Agile project management - Scaling agile methods. Understanding product owner role - Working with product backlog - Planning the release, **Agile model driven development (AMDD)**

**Suggested Activity**

Demo on Kanban

**Unit 5 ADVANCED SOFTWARE ENGINEERING**

6+4

Software Reuse –benefits, problems, model view controller, COTS product reuse, Distributed Software engineering - Architectural patterns for distributed systems, Software as a service, **Performance engineering.**

**Suggested Activity (not limited to)**

1. Improve the reusability and maintainability of the software system by applying appropriate design patterns.
2. Implement the modified system and test it for various scenarios

Total (L:30+P:30)60 Periods

**OUTCOMES:**

CO#	Course Outcomes	RBT Level
1	Assess the roles of software process	E
2	Compare different software engineering methodologies.	AN
3	Develop real-world software development projects	C
4	Adapt agile methodology in real world software engineering projects	AP
5	Assess software Projects responding to change and involving customer in the development process.	E

**TEXT BOOKS:**

1. Ian Sommerville, “Software Engineering”, 10th Edition, Pearson Education Asia.
2. Roman Pichler, “Agile Product Management with Scrum Creating Products that CustomersLove”, Pearson Education.

**REFERENCES:**

1. Roger S. Pressman and Bruce Maxim, “Software Engineering – A Practitioner’s Approach”, Ninth Edition, Mc Graw-Hill International Edition.
2. Ken Schwaber , “Agile Project Management with Scrum” , Microsoft Press.
3. Tilak Mitra, ”Practical Software Architecture: Moving from System Context to Deployment”, IBM press.

**List of equipment for a batch of 30 students:**

**SOFTWARE:**

ArgoUML/ Rational Suite that supports UML 1.4 and higher /Selenium/ JUnit 30 Nos,  
Online resources for demo on Kanban.

**HARDWARE:**

Standalone desktops with Windows 7 or higher.

**COURSE ARTICULATION MATRIX**

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.	3	2	3	2	3	3	3	2	3	1	3	3	3	3
2.	3	2	3	2	3	3	3	2	3	1	3	3	3	3
3.	3	2	3	2	3	3	3	2	3	1	3	3	3	3
4.	3	2	3	2	3	3	3	2	3	1	3	3	3	3
5.	3	2	3	2	3	3	3	2	3	1	3	3	3	3

<b>IT22411</b>	<b>MICROPROCESSOR AND MICROCONTROLLER</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>INTERFACING LABORATORY</b>				
		<b>0</b>	<b>0</b>	<b>3</b>	<b>1.5</b>

**Objectives:**

- Introduce ALP concepts and features
- Write ALP for arithmetic and logical operations in 8086 and 8051
- Differentiate Serial and Parallel Interface
- Interface different I/Os with Microprocessors
- Be familiar with MASM

**List of Experiments**

**8086 Programs using kits and MASM**

1. Basic arithmetic and Logical operations
2. Move a data block without overlap
3. Code conversion, decimal arithmetic and Matrix operations.
4. Floating point operations, string manipulations, sorting and searching
5. Password checking, Print RAM size and system date
6. Counters and Time Delay

**Peripherals and Interfacing Experiments**

7. Traffic light control
8. Stepper motor control
9. Digital clock
10. Key board and Display
11. Serial interface and Parallel interface
12. A/D and D/A interface and Waveform Generation

**8051 Experiments using kits and MASM**

13. Basic arithmetic and Logical operations
14. Square and Cube program, Find 2's complement of a number
15. Mini project using modern microcontrollers

Total (P:45)

**OUTCOMES:**

CO#	Course Outcomes	RBT Level
1	Write ALP Programs for fixed and Floating Point and Arithmetic	AP
2	Infer different I/Os with processor	U
3	Generate waveforms using Microprocessors	U
4	Execute Programs in 8051	AP
5	Assess the difference between simulator and Emulator	AN

**TEXT BOOKS:**

1. Yu-Cheng Liu, Glenn A.Gibson, —Microcomputer Systems: The 8086 / 8088 Family - Architecture, Programming and Design, Second Edition, Prentice Hall of India, 2007.
2. Mohamed Ali Mazidi, Janice Gillispie Mazidi, Rolin McKinlay, —The 8051 Microcontroller and Embedded Systems: Using Assembly and C, Second Edition, Pearson Education, 2011

**REFERENCES:**

1. Douglas V.Hall, —Microprocessors and Interfacing, Programming and Hardware:,TMH, 2012.

**Equipment's Required****HARDWARE:**

- 8086 development kits - 60 nos
- Interfacing Units - Each 15 nos
- Microcontroller - 60 nos

**SOFTWARE:**

- Intel Desktop Systems with MASM - 60 nos

**COURSE ARTICULATION MATRIX**

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.	3	2	2	3	2	1	1	-	-	1	-	-	-	2
2.	3	2	2	2	2	-	-	-	-	-	-	-	-	-
3.	2	2	2	2	2	1	-	-	-	1	-	-	-	2
4.	2	2	2	2	2	1	-	-	-	-	-	-	-	2
5.	2	2	2	2	2	-	-	-	-	1	-	-	-	2

IT22412

**OPERATING SYSTEM CONCEPTS  
LABORATORY**

L T P C

0 0 3 1.5

**Objectives:**

- Learn shell programming and work in the UNIX environment.
- Be exposed to programming in C using system calls.
- Be exposed to process creation and inter process communication.
- Be familiar with implementation of CPU Scheduling Algorithms, page replacement algorithms and Deadlock avoidance.
- Be familiar with File Organization and File Allocation Strategies.

**List of Experiments**

1. Illustrate UNIX commands and Shell programming
2. Process Management using System Calls-Fork, Exit, Getpid, Wait, Close
3. CPU scheduling algorithms
  - a) Round Robin b) SJF c) FCFS d) Priority
4. File allocation strategies
  - a) Sequential b) Indexed c) Linked
5. Mutual exclusion by Semaphore
6. File Organization Techniques
  - a) Single level directory b) Two level c) Hierarchical d) DAG
7. Bankers Algorithm for Dead Lock Avoidance
8. Algorithm for Dead Lock Detection
9. Page replacement algorithms
  - a) FIFO b) LRU c) LFU
10. Inter process communication.
11. Paging Technique of memory management.
12. Various disk scheduling algorithms.
13. Multithreading
14. Install any guest operating system like Linux using VMware.

Total (P:45)

**OUTCOMES:**

CO#	Course Outcomes	RBT Level
1	Understand the concepts of basic UNIX commands and shell programming.	2
2	Evaluate the performance of various CPU scheduling algorithms and deadlock avoidance and detection Algorithms.	5
3	Analyze the performance of various page replacement algorithms.	4
4	Develop File Organization and File Allocation Strategies.	3
5	Assess the performance of various Disk Scheduling Algorithms.	5

**TEXT BOOKS:**

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", 10th Edition, John Wiley and Sons Inc.

**REFERENCES:**

1. Andrew S Tanenbaum, "Modern Operating Systems", Pearson, 5th Edition.

**Equipment's Required**

**(List hardware and software needed for 60 no's)**

Standalone desktops with C / C++ / Java / Equivalent compiler 30 Nos. (or)  
Server with C / C++ / Java / Equivalent compiler supporting 30 terminals.

**COURSE ARTICULATION MATRIX**

COs	POs												PSOs	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1.	3	1	3	1	1	-	-	-	1	3	3	3	3	3
2.	3	1	1	2	2	-	1	-	3	2	1	1	2	2
3.	3	3	2	1	2	-	-	-	3	3	1	2	2	2
4.	1	2	2	3	2	-	-	1	3	1	3	1	2	2
5.	2	2	1	1	3	-	-	-	1	2	2	3	2	2